ILLUMINATING ENGINEER

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The Illuminating Engineering Society

A Record of Progress.

MEMBERS of the Illuminating Engineering Society may well feel gratified at the record of progress contained in the usual annual report of the Council (see pp. 182-5), which was presented at the Annual Meeting on June 17th. The past year was generally regarded as one of unprecedented depression. Yet, amongst other feats, the Society maintained its income, added to its membership, and obtained (for the second year in succession) a record attendance at the annual dinner. Interesting features have been the growth in the list of sustaining members, amongst whom a number of gas and electric supply undertakings are now included, and the preparatory steps taken towards the formation of local centres in the Midland and North-Western areas. The Society has indeed made good progress since the early days recalled in the address of its President (Sir Francis Goodenough), who was one of the original members enrolled 23 years ago. Not the least satisfactory feature of the past session has been the active part taken by the Society in the International Illumination Congress, firstly through the services of many of its leading members who served on committees and otherwise undertook responsible work; secondly, in raising, partly from its own funds and partly by special subscriptions, a substantial contribution towards the Congress funds.

This measure of success is, we think, largely a result of the efforts made to broaden the basis of responsibility. The number of members who contribute personally to the well-being of the Society and take an active share in its work is already much greater than in the past. We hope that this tendency will be still further developed. A consciousness on the part of each member that he (or she) is one of the architects of the Society's fortunes is a potent means of maintaining that enduring enthusiasm and affection which all permanently prosperous societies must somehow kindle amongst their followers.

The distinctive character of the Society was ably illustrated in the Presidential Address. As Sir Francis pointed out, the Society is almost unique in the welcome it affords to both users and producers of light. One is glad to observe the general recognition that the Illuminating Engineering Society is doing work that no other body could readily perform.

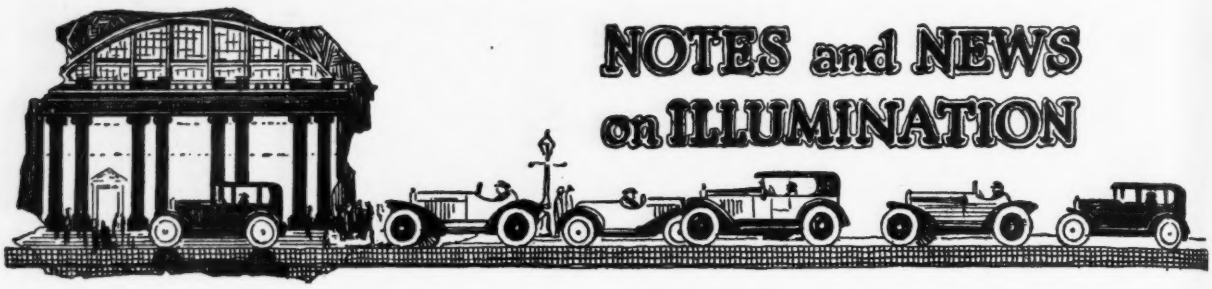
The Work of a Public Lighting Department

THE paper on the above subject (see pp. 167-172) read by Mr. E. Marrison before the joint meeting of the Illuminating Engineering Society and the Association of Public Lighting Engineers on May 24th was an admirable effort. Being mainly descriptive, the paper naturally did not afford so much scope for argument as some, but much of the subject-matter was new to those present, and a number of interesting points were raised in the discussion.

The comprehensive account of the duties and equipment of the Public Lighting Department at Sheffield came as a revelation to some of the audience. One can scarcely doubt that the enterprise of the Sheffield Corporation has been fully justified. A city of any size would do well to provide for a qualified independent public lighting engineer, and to furnish him with an adequately equipped testing laboratory. A well-run department can save a city large sums of money when new installations have to be planned. But its services in connection with maintenance are at least equally important; on the competence of the department in this respect depends how near the actual street-lighting conditions approach those originally planned (in certain cities the departure has been found to be quite considerable!).

The table analysing the expenditure of the department (see p. 168) aroused a considerable amount of interest. It was pointed out, for example, that the complete cost of the gas and electric lamps, including both fuel and maintenance, was only 40 per cent. of the total—so that if this item were increased by 50 per cent. the total expenditure of the department would only rise by 20 per cent. If the cost of gas and electricity *only* were considered the proportion would be still less. It can be readily understood, therefore, how extreme economy in the use of gas and electricity may react unfavourably on the lighting conditions and yet not diminish very materially the total expenditure on public lighting.

Finally, we may recall the suggestion that a specification, to serve as a basis for annual reports on public lighting, should be framed. This suggestion may be commended to the notice of the Association of Public Lighting Engineers. Doubtless guidance on the contents of such reports would sometimes be helpful; yet one would not wish the public lighting engineer to be unduly fettered in his choice of material.



The A.P.L.E. Congress

REPORT ON PROGRESS IN STREET LIGHTING.

We understand that provisional programmes of the arrangements for the 9th Annual Meeting and Conference of the Association of Public Lighting Engineers, to be held in Blackpool during September 5th-8th, will be circulated shortly. The Congress seems likely to prove an exceptionally interesting one, and we hear that applications from members and delegates have already approached the 200 mark. Members who wish to attend but have not yet notified the Hon. Secretary should do so without delay. In particular, members of all classes are asked to do all they can to aid the Hon. Editor of the Association of Public Lighting Engineers (Mr. E. J. Stewart, 20, Trongate, Glasgow) by sending him information on developments in public lighting in their areas. This information will be incorporated in the report on progress in street lighting which now forms such a useful supplement to the annual report of the Association. Particulars of technical developments (i.e., new lighting installations, luminous traffic-control equipment, etc.), will be useful, and information illustrating the benefits of good lighting in diminishing accidents or aiding the passage of traffic will be particularly welcome. There are two other questions of considerable interest at the present time. In what way and to what extent is the British Standard Specification for street lighting influencing the design of new installation work? To what extent is the present financial stringency holding up seriously needed lighting schemes and renewals? It would be very helpful to have the experience of members on these two topics. As Mr. Beveridge recently remarked, at the Congress of the National Safety-First Association, it is somewhat singular that whilst the *national health* is confided to the care of a special Ministry, the *national safety* is apt to be less seriously considered; local authorities should bear in mind that restrictions in public lighting, by endangering public safety and causing delay in the handling of traffic, may prove anything but economical in the long run.

Britain's Year of Opportunity

In his address to the Convention of the Advertising Association last month Mr. R. H. Stevens alluded to the present year as "Britain's Year of Opportunity," and emphasized the power of advertising in combating depression. He remarked, truly enough, that many people are "sitting on the fence shivering with economic funk," cutting down their advertising, adopting a so-called conservative but injudicious policy of retrenchment, and reaping the natural result in dwindling business. We are glad to think that most of those in the lighting industry are adopting a more enlightened attitude. Furthermore, when the history of this melancholy period comes to be written, it should surely be set to the credit of the lighting industry that in 1931 it boldly supported the International Illumination Congress and the floodlighting display, thus setting a shining example and making a reassuring gesture at a moment of national crisis!

Ultra-violet Radiation in the Poultry Industry

Mr. L. C. Porter, whose interest has been excited by Mr. Rowland's recent paper on "The Application of Electric Light to Agriculture," has favoured us with a copy of a booklet, issued by the Nela Park Engineering Department of the General Electric Company, U.S.A., summarizing recent experiments with ultra-violet light in the poultry industry. Apparently three chief sources of ultra-violet light are being used for this purpose, i.e., sunlight lamps using a combination of tungsten filament and arc operating in mercury vapour, incandescent lamps having a high-efficiency tungsten filament operating in a bulb of special glass transparent to the longer ultra-violet wavelengths, and low-pressure mercury lamps of low luminosity. Experience seems in line with that recorded by Mr. Rowland in regard to the greatly improved output of eggs, as a result of irradiation, during the winter period, which is illustrated by graphs. It is also mentioned that the weight of eggs improved and the number of broken eggs diminished—the irradiation apparently resulting in a thicker shell. In view of the query raised by Mr. J. Eck in connection with Mr. Rowland's paper it is particularly interesting to observe that similar beneficial effects were recorded on a duck farm, where an increase in egg-production of 11 per cent. was recorded. A curious circumstance was that although the percentage of fertile eggs was apparently slightly less in the case of ducks treated with ultra-violet radiation, there was a gain of 9.1 per cent. in the number of ducks hatched out. Chickens and ducks both seemed to benefit from exposure to the lamps, one special point being the successful treatment of birds with weak legs (an effect analogous to the familiar treatment of rickets in children). The merits of light containing a substantial ultra-violet element, as compared with visible light only, certainly deserve study; it is suggested that the low-luminosity mercury lamps mentioned above would prove useful in cases where a bright light would aggravate cannibalism.

The Journal of Scientific Instruments

A departure is now being made in the *Journal of Scientific Instruments*, which is produced by the Institute of Physics with the co-operation of the National Physical Laboratory. Hitherto the chief feature of this journal has been the publication of specialized articles on definite forms of instruments. It is now proposed to supplement such notes by articles of a wider scope, dealing with the trend of development of various classes of instruments or with matters of general interest to manufacturers and users. About twenty-five authorities have already promised to contribute, and the subjects chosen cover a wide field.

This new departure should add materially to the interest of the journal; it seems evident that descriptions of instruments and apparatus could profitably be supplemented by some account of their applications in practice.

TECHNICAL SECTION
COMPRISING
Transactions of The Illuminating Engineering Society and Special Articles
The Illuminating Engineering Society is not, as a body, responsible for the opinions expressed by individual authors or speakers.

The Work of a Public Lighting Department

By E. MARRISON

(Paper read at the Joint Meeting of the Illuminating Engineering Society and the Association of Public Lighting Engineers, held at the E.I.M.A. Lighting Service Bureau, 15, Savoy Street, Strand, London, W.C.2, at 6-30 p.m., on Tuesday, May 24th, 1932.)

Introduction.

TO provide the inhabitants of a city with well-lighted highways is an obligation on the responsible official which cannot be over-estimated.

Prior to May, 1924, the street lighting of Sheffield was under the supervision of the Chief Constable, assisted by a Lighting Superintendent. Upright burners were in use, and the lanterns were made to accommodate the large gas consumptions used in flat-flame lighting.

During the War years the necessary curtailment of street lighting was carried out with the result that many lamps were out of commission, and the gas consumption of others much reduced. When the restrictions were removed the overhaul and re-lighting of the lamps was very slow, and repairs were made with reluctance, because it was realized that the system would require changing. The lanterns and burners were therefore in a state of disrepair, and the maintenance was also poor.

Such were the conditions when a Lighting Engineer was appointed with entire control. The improvements that have taken place are well known, and the fact that new premises have been erected during a time of national financial stringency is further evidence, if any is needed, that the street-lighting service and its requirements are appreciated.

The main purposes which make for effectiveness in street lighting are:—

(*a*) To provide and maintain in good condition a sufficient and efficient service, thereby promoting safety and convenience in the streets at night through adequate visibility.

(*b*) To enhance the value of the street to the community.

(*c*) To increase the attractiveness of the street.

Street lighting serves utilitarian purposes. Protection to persons and property is afforded, and police supervision is reduced.

New Premises.

Before dealing with the work of the department perhaps a brief description of the layout of our new premises may be of interest.

In April, 1931, the Sheffield Lighting Department removed into an up-to-date and commodious building with well-equipped workshops and stores, facilities for testing lamps and fittings, and with adequate office accommodation.

After the scheme had been sanctioned by the City Council, the Lighting Engineer prepared and supplied to the City Architect a schedule of the accommodation required, and discussed with him the general layout of the workshops, etc. Later a rough sketch plan was submitted by the Lighting Engineer to the City Architect. Further discussions took place, and eventually the architect's plans were prepared, and with some slight alterations were worked to. The site occupies 2,466 square yards, and the cost of erection was £15,500. The workshops, etc., are laid out as follows:—

Ground Floor. Tinsmiths', lamp erectors', glaziers' and painters', blacksmiths' and ladder repairers' workshops, general store, testing room, garage, covered yard, two open yards and lavatory accommodation.

Direct access is obtained from the stores to the tinsmiths' and lamp erectors' workshops, and this has proved economical in saving labour during the transport of lighting plant.

A central heating system is installed in the premises, and for this purpose a gas-heated boiler is housed in the basement. The boiler has thermostatic control, so that there are no labour charges. It is very efficient and, when cleanliness of the installation is taken into account, is economical in operation. There is also a drying room for clothes in the basement.

First Floor. Lighting Engineer's, Chief Clerk's, typist's and photometer rooms, general office, lavatory accommodation and foreman's house.

Second Floor. Drawing office, Surveyor's room and photographic dark room.

Over the garage is a large dining-room with a separate kitchen. This room is also used for technical meetings and social events in connection with the welfare section of the department, and is an acquisition that is much appreciated by all.

The work carried out in the various workshops is:—

Tinsmiths' Workshop. The manufacture and repair of street lanterns, making services and cleaning burners that have been brought in for overhaul.

Lamp Erectors' Workshop. Cutting, tapping and screwing of gas pipes, the assembling and fitting of electric-light standards and brackets,

and the assembling of the complete gas and electric lamps preparatory to their erection on the streets.

Glaziers' and Painters' Workshop. Glazing and painting gas and electric lanterns and other street-lighting plant.

Blacksmiths' Workshop. Work in connection with the tinsmiths' and lamp erectors', such as repairing crinolines and making iron wall brackets.

Ladder Repairs Workshop. Repairing ladders, etc.

General Store. Contains stocks of gas mantles, electric lamps, gas and electric lanterns, burners, controllers, gas and electrical fittings, glass, reflectors, and other materials used in connection with street lighting. Racks fitted with wire netting for ventilation purposes are used for storing mantles. Other racks house gas and electric lanterns, reflectors, globes, etc., and storage bins are used for smaller materials, such as sockets, setscrews, etc. The racks are so fitted and arranged that the minimum of labour in handling goods is assured.

A separate store is necessary for carbide, and petrol is contained in a 500-gallon tank in the ground at the entrance to the garage.

Testing Room. For testing and adjusting burners and governors—measuring for gas consumption. Testing various devices for the automatic control of gas and electric lamps, i.e., switching on and off.

Garage. For housing three motor-lorries. There is an inspection pit in the garage.

Covered Yards and Open Yards. A 10-cwt. overhead crane is erected in the covered yard for moving pillars. Pillars are painted here as well as in the open yards. An extension hand tower wagon is housed in the covered yard, and an inspection pit has been made for use with a proposed motor tower wagon we hope to have eventually for the maintenance of the street lighting.

Photometer room. For measuring light output of all kinds of gas and electric lamps. Testing the efficiency of various devices for the suitable distribution of light for street-lighting purposes. Testing burners for consumption and gas mantles for durability.

Foreman's House. The lamplighter foreman lives on the premises, and is therefore able to attend to lighting-plant breakdowns throughout the city, or to get into touch with those capable of attending to such faults when the regular staff is off duty. The foreman also acts in the capacity of caretaker.

The number of men actually working in the premises is 54. They are lamp fitters, tinsmiths, glaziers, painters, stores and Testing Department staff. There is, of course, the administrative staff to look after the 90 men employed outside in lighting, extinguishing, cleaning and maintaining the street lamps.

Supervision.

The Lighting Engineer supervises and is responsible to the Lighting Sub-committee of the Corporation for all persons attached to, and for all work in connection with the department, such as initiating new lighting schemes; the control and organization of an efficient street-lighting system. Foremen, surveyors, etc., are appointed to assist and report on that control and organization daily.

Financial Arrangements.

How the money is obtained to enable this important service to be efficiently maintained to keep pace with modern developments, particularly in regard to the increasing volume of motor traffic, is a fundamental feature.

The procedure in Sheffield is that in November or December of each year the estimates of expenditure and income for the following financial year (i.e., commencing April 1st) are prepared in detail. The requirements necessary under the various headings, such as wages, gas, electric current, new work, maintenance of lamps, etc., is estimated, and when completed the estimates are presented to the Lighting Sub-committee for consideration. After approval by that Committee they are eventually very severely scrutinized by the Finance Committee. The latter body usually see to it that "cuts" are made.

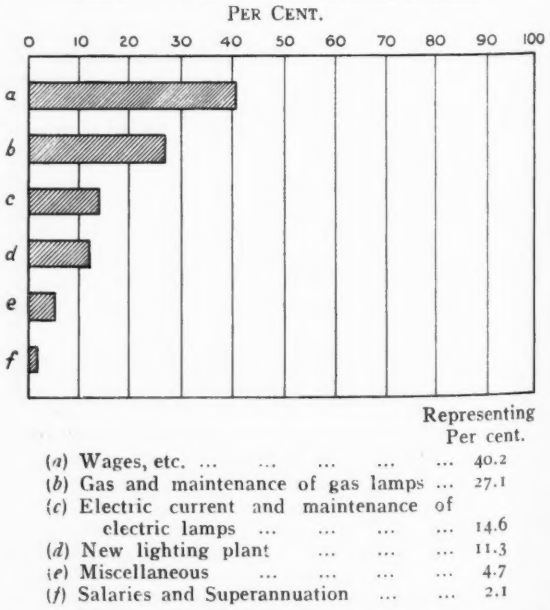
However, when the Finance Committee have passed the estimates for the whole of the Corporation departments, the City Treasurer has them printed, and they are finally submitted to each member of the City Council for the "blessing" of that body, and with a view to fixing the amount of the city rate for the ensuing half-year.

The amount voted to the Lighting Department for the last financial year was £65,000, after having taken into consideration an estimated revenue of £790 to be derived from various sources, such as gas for private lamps, accounts collected in respect of damage to street-lighting plant through accidents or otherwise, and scrap materials disposed of.

A careful scrutiny has to be maintained each month to ensure that we keep within the prescribed limits for each item of expenditure, for, in spite of the increasing importance of street lighting over the country, the amount voted for its upkeep is usually not generous. While there appears to be a growing desire in certain towns to give the necessary recognition and financial support that is warranted, this starving of a street-lighting system is unfortunately still too prevalent. It seems to suggest the need for educational work among public authorities generally, otherwise the deplorable conditions up and down the country would not exist.

I have prepared a graph showing how the expenditure is allocated for the year ending March 31st, 1932:—

Amount Voted by City Council, £65,000.



	Representing Per cent.
(*a*) Wages, etc.	40.2
(*b*) Gas and maintenance of gas lamps ...	27.1
(*c*) Electric current and maintenance of electric lamps	14.6
(*d*) New lighting plant	11.3
(*e*) Miscellaneous	4.7
(*f*) Salaries and Superannuation	2.1

You will observe that wages, gas, electric current, and maintenance of lamps are the most important items and account for 81.9 per cent. of the gross expenditure.

Orders.

Efficient methods must be employed to disburse a large sum of money if the best results are to be obtained. The practice in force in the Sheffield Lighting Department may be of interest to you. I

will deal first of all with the procedure relating to the contract for lamp pillars. Tenders for these are invited in the local press and technical journals. Firms desirous of sending in a tender apply to the Lighting Engineer, and are supplied with a drawing and specification of the pillar required together with a form of tender and conditions of contract. Details such as overall length above ground level, base and weight, etc., are given in the specification, and a sample pillar is put aside by the storekeeper for inspection purposes by representatives of firms tendering who may desire to see the type of pillar used in Sheffield. On receipt of the tenders they are opened by the Chairman of the Lighting Sub-committee, then tabulated and presented to the Committee for consideration. The accepted tender is duly confirmed by the City Council, and the Town Clerk arranges for the Corporation seal to be affixed to the form of tender. The tender is usually let for a period of 12 months. Eventually the pillars are received, and they are carefully examined to see that they conform exactly to sample. Any pillar sent in that is not equal to our requirements is returned to the makers and is replaced by them at their expense.

The purchase of uniform clothing is also by contract, and a similar procedure to that just described for pillars is adopted. All goods are entered in a "Requisition Book" and submitted to the appropriate committee for their approval before orders are issued. When authority has been received from the committee, an official order, always issued for all requirements, is typed in triplicate and each set consecutively numbered. The first copy is supplied on the supplier, the second retained for reference in the office and for comparison with the accounts by the City Treasurer and the third copy, which is specially ruled to note deliveries, etc., and on which no prices appear, is held by the storekeeper. The copies retained by the department are housed in loose-leaf binders fitted with a locking device. A daily return is made by the storekeeper in his goods-received book of all deliveries to us, and this is sent to the office each day for inspection. Items on the accounts are subsequently checked from this source.

All articles are carefully examined by the storekeeper as they arrive to see that inferior goods are not supplied. For instance, burners are tested for gas consumption, efficiency, etc., before they are handed over to the lamp-erecting staff for use on the street. Paint is also tested for durability, and samples that are sent to the department from time to time are put on test, and reports made to the Lighting Engineer thereon.

Accounts.

It is necessary for all invoices to be rendered to the department in duplicate; one being forwarded to the City Treasurer for payment, and the copy retained in the office and filed for future reference.

A separate folder is kept for each creditor in a vertical filing cabinet. The accounts are examined thoroughly; quantities and prices verified and calculations checked before they are certified for payment. A summary is prepared and attached to the invoices which are sent to the City Treasurer a few days before each meeting of the committee. A further summary is made out monthly for the information of the Lighting Engineer, showing the actual expenditure as against the estimated expenditure for each item as set out in the annual estimates already mentioned. This classification is very essential to obviate the possibility of exceeding the amount voted for any item. If it is found necessary to overspend on a certain section of the estimates to a substantial extent it is possible to obtain a supplementary estimate to cover this contingency, but this course is not taken except under special and unforeseen circumstances. The accounts I have dealt with are those met by the Corporation. Our department is not a trading concern, therefore we have few accounts to send out. The accounts to be collected by the City Treasurer for the Lighting Department comprise those in respect of damage to lighting plant through street accidents, and the cost of repairing damage to street lamps frequently occasioned maliciously. Particularly in the latter case we are sometimes unable to obtain the name of the person or persons responsible for the damage, but in this direction the police render valuable assistance. Accounts are also rendered for gas for private lamps, etc., and scrap materials disposed of periodically.

The number of street lamps is constantly altering. Notices of new lamps lighted and existing lamps discontinued, as well as lamps temporarily out of commission are sent to the Gas Company and the Electric Supply Department. Records of these alterations are kept in our registers, and the quarterly accounts can therefore be checked accurately to ensure that the correct debits and credits are made.

Miscellaneous.

There is much miscellaneous work which it is unnecessary to describe in detail. Reports are written and statistical information collated with reference to the number of lamps in use. Estimates of the cost of new lighting schemes have also to be prepared and submitted for approval, and preparation for Committee meetings has to be made. Improved ways and methods of doing things are continually requiring attention. New forms, for example, are sometimes necessary for devising a standard way of recording information. Then there is correspondence, filing, and register work that constitutes a large percentage of the duties of the office staff.

Daily Time Sheets.

The lamplighter's daily time sheet is a return of work done, and much information is extracted from it. The lines are received in the office each morning (Saturday and Sunday time lines together on Monday morning). On receipt, they are checked as to the correct lighting and extinguishing times, time of survey, time spent on cleaning lamps, number of lamps cleaned, mantles and electric lamps used, and a note made of reports, such as lamps out through a technical fault. The total time spent on each class of work is summarized; the number of hours worked weekly by each lamplighter is noted, and averages taken out monthly. The number of mantles and electric lamps used on the street lamps is extracted and entered against the particular lamps in the respective registers. The surveying staff are constantly going over the rounds of the men, and disciplinary action is taken if the time sheet is found to have been filled up untruthfully.

The lamp erectors, tinsmiths, and other men who report daily at the department book their time by means of a time-recording clock.

The wages book is made up weekly from Thursday to Wednesday inclusive. Additions, extensions, etc., are checked as to accuracy, and the book is then forwarded, together with a summary of the wages, to the City Treasurer every Thursday for the monies to be allocated ready for payment on the following day. The outdoor staff report every Friday at the stores for their stocks to be made up to the original quantity, and to receive wages.

Mantle Consumption.

The following figures relating to the number of mantles used during the twelve months ended

November 30th last may be interesting:—

Nozzles in use	Mantles used	Mantles used per nozzle
38,373	92,110	2·4

In looking over our records we find that some men use a far greater proportion of mantles than others. The fact is taken into consideration that some rounds are in a worse locality than others, but we find that in actual experience the man who uses a small number of mantles usually has a well-kept round, which proves that carefulness in the handling of lighting plant is a most important matter. When a round is kept up to a high standard of efficiency the attractiveness of the thoroughfares in that round is increased, and the safety and convenience in those thoroughfares are largely dependent upon that factor. At the same time, the street-lighting system is more economical and the value of our department is enhanced. There is no doubt that the efficiency in street lighting depends very largely on the adequate reporting of and attention to defects by the lamplighting staff, and very great care is taken to make this as comprehensive as possible by using daily work lines and other forms which provide for every variety of report likely to be encountered. A monthly note is handed to each lamplighter giving the average of mantles used, and the average over the city. This was initiated to promote carefulness, and undoubtedly it has rendered useful service in this direction.

Lighting Schemes.

Ordnance sheets of the whole of the city are kept in the drawing office. Drawings and plans of new schemes and rearrangements of lighting plant are prepared here. Where additional lighting is required in a thoroughfare a plan is drawn showing the existing lighting points, and the gas or electric main. The ground is first visited by the Lighting Engineer. Thereafter a lighting scheme or lighting schemes are prepared and submitted to the Lighting Committee.

The lighting of new housing estates has to receive early consideration because of building developments. A large layout plan of the estate is sent by the City Architect to the Lighting Engineer. This is of great assistance in the preparation of the lighting schemes. When these have been finally arranged, costs are made up for the consideration of the Lighting Committee. After authority has been received the work is put in hand. In some instances it is necessary to alter the position of a lamp from that previously allotted on the plan because of building operations; sometimes a garage or house entrance is at the point marked on the plan for a street lamp. This, of course, could not be foreseen at the time the plan was dealt with.

So far as gas lighting is concerned, the lamp-erecting staff erect the pillar, lantern, burner, etc., completing the job with the exception of connecting to the gas main. The Gas Company do this after the receipt of a notification from the department. A similar procedure is adopted with regard to electric lighting.

On busy thoroughfares, such as tram routes, we use the existing tram-poles, and affix a 6-ft. bracket-arm over the roadway. The Tramways Department are paid a nominal sum for the use of the poles, which is a convenient arrangement, because further obstructions on the footpath are kept to a minimum, although it is found that the spacing of the tram-poles does not always allow the street lamp to be fixed in the best position from a lighting point of view.

After the completion of a new lighting scheme, or any alterations to existing plant, the thoroughfares in question are inspected during lighting hours by the surveying staff, and a report is furnished to the Lighting Engineer on the general lighting effect.

Notices are sent to us from time to time by the City Engineer's Department of street works proposed to be carried out. On receipt of these, the thoroughfares are inspected, and where lighting mains are required, which is often the case, lighting schemes are prepared and arrangements made for our work to be done when the highway people are on the job. We are thereby saved the cost of roadway and footpath repairs.

We have completed the lighting of 2,344 courts in the city. These are places which constitute the *only* access to two or more houses. The gas service is run from the street along the wall of the passage, and a bracket lamp affixed in the court itself. In some cases it is possible to erect the lamp in such a position that two courts are satisfactorily lighted. The owners of the property, as well as the tenants, have appreciated this service very highly, and we have had little trouble as the outcome of attaching lighting plant to property. Any damage to the brickwork is repaired by the Lighting Department, and it is realized by the landlords that the lamps afford protection to their premises.

All the street lamps in the City are numbered. For this purpose the city is divided into 25 districts, each given a letter of the alphabet. The lamps are therefore numbered A1 to A999, B1 to B999, and so on. It will be obvious that this method of identification of a lamp, irrespective of its position on the street, requires careful handling. It has, however, proved very successful. The round of each man is recorded in detail, and a summary of the plant is attached.

Maintenance.

It is most essential to have a good maintenance system in operation if the lighting of a city is to be kept up to a high standard of efficiency. In Sheffield the lamplighters attend to the maintenance of the lamps under their charge as well as lighting, extinguishing and cleaning. Each man has his own area, and for a hand-controlled round he looks after approximately 120 lamps, and for an automatically controlled round 200 to 240. The lamps are cleaned in rotation and a return made on the daily time sheet previously mentioned. Gas burners must be given careful attention and cleaned periodically, mantles renewed where necessary and minor stoppages cleared, if good lighting is to be maintained properly. Defects which cannot be dealt with by the lamplighter or attendant are reported to the office and receive the attention of the lamp-erecting staff.

Broken lantern panes are reported to the office on a form designed for that purpose. The outdoor glazing is carried out by a staff who are always engaged on this work.

During the last financial year 110 gas-lamp controllers were returned to the makers for repairs, and 771 were cleaned and regulated in our own workshop. Many of the defects, also many of the adjustments, made by ourselves were exceedingly slight.

Daily returns are made out by the foremen showing the various work carried out on the preceding day, and from these returns graphs are made showing weekly progress of new lamps erected, lamps overhauled and changed, maintenance labour hours, etc.

A full kit of tools is provided for each man, and inspections are made at frequent intervals to see that no tools are missing. Instructions are given that

any loss must be reported immediately, and disciplinary action is taken if this is not done.

All ladders used by the men are examined every six months to ensure that they are in a good state of repair. The repairs are carried out in our ladder repair shop.

Automatic Lighting.

The lamplighter, who has been such a familiar figure in the past, is gradually disappearing, and his place taken by a lamp attendant who does not light or extinguish the lamps. The majority of the street lamps in Sheffield are now automatically controlled by clockwork mechanism individually. The electric lighting in main thoroughfares and new housing estates is controlled by means of time switches. There are still some hand-lit rounds, but these are being converted to the modern method of control. The rate of progress is shown herewith:—

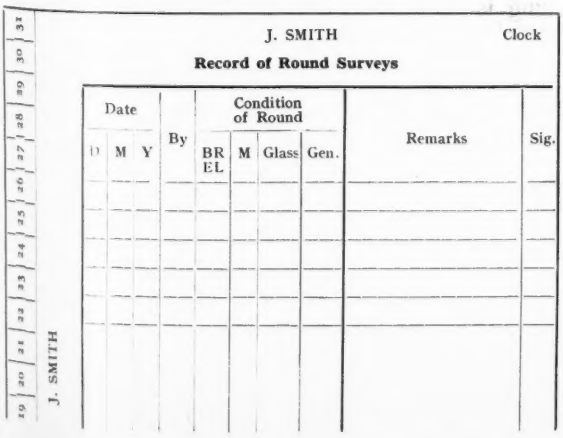
Financial Year	Mechanical control			Manual control			Total No. of lamps
	Elec.	Gas	Total	Elec.	Gas	Total	
1928/29	2,261	5,830	8,091	287	8,696	8,983	17,074
1929/30	3,037	8,083	11,120	155	7,309	7,464	18,584
1930/31	3,713	10,513	14,226	154	5,195	5,349	19,575
1931/32	4,384	12,842	17,226	121	2,845	2,966	20,192

Mechanical control is cheaper than hand control, and it is advantageous because practically simultaneous lighting and extinguishing is effected. Busy routes and junctions are more effectively dealt with in this manner, and thereby made safer for the community.

The men clean lanterns and wind clocks Monday to Thursday inclusive. On Fridays they clean lanterns, wind and set clocks and on Saturdays finish winding and setting clocks. A nightly inspection of his round is made by each man, who replaces mantles or electric lamps where necessary, and remedies minor defects. Experience shows that if an accident occurs and a street lamp in the vicinity is not lighted, the person, or persons, involved in the accident invariably quote this as a contributory cause.

A card record is kept of each controller, details such as the number of the clock, date fitted and situation, and general history as to repair, etc., are entered. A similar adaptation is applied for the time switches.

The surveying staff makes inspections nightly and reports to the Lighting Engineer daily on the general condition of the city lighting. This information is recorded on a card provided for each round, and a coloured signal is attached to signify when a particular round has to be visited again—usually the period is 14 days. The system has proved most successful and effective in maintaining proper lighting. The data on the card is:—



A small margin on the left-hand side is divided into 31 sections and numbered consecutively to represent each day of the month. The signal referred to is affixed to a particular date.

A motor survey is also made daily; in the morning to see that no lamps are burning after schedule time, and in the evening for the purpose of reporting, as explained. Any defects are rectified immediately by this method, and approximately 30 miles of thoroughfares are covered during each inspection.

The efficiency of clock controllers—given proper attention—is very satisfactory. From records we find that on an average there is one failure only in approximately 600 operations. In order to arrive at these figures the men make a return on a form supplied to them for the purpose.

Lighting Schedule.

The formation of a lighting schedule to meet the requirements of a street-lighting service all the year is a very difficult matter because of the varying climatic conditions that exist in this country. However, careful observations are made weekly, and from these records yearly lighting schedules are made up—one for automatic lighting and one for hand lighting—giving the weekly lighting and extinguishing times. The men are notified every Friday by means of two large notice-boards, with two 10-in. diameter time indicators mounted on each, showing the times for automatic and hand control respectively. The time indicators are placed in a prominent position in the stores, and are readily seen by the men when they report for their weekly supplies. This method has recently displaced the issue of a lighting schedule to each man, and is more flexible in handling, particularly for weather fluctuations. The Gas Company, Electric Supply Department and the Chief Constable are informed weekly of the times in operation. For the last financial year the total number of burning hours for Sheffield was 3,732.

General.

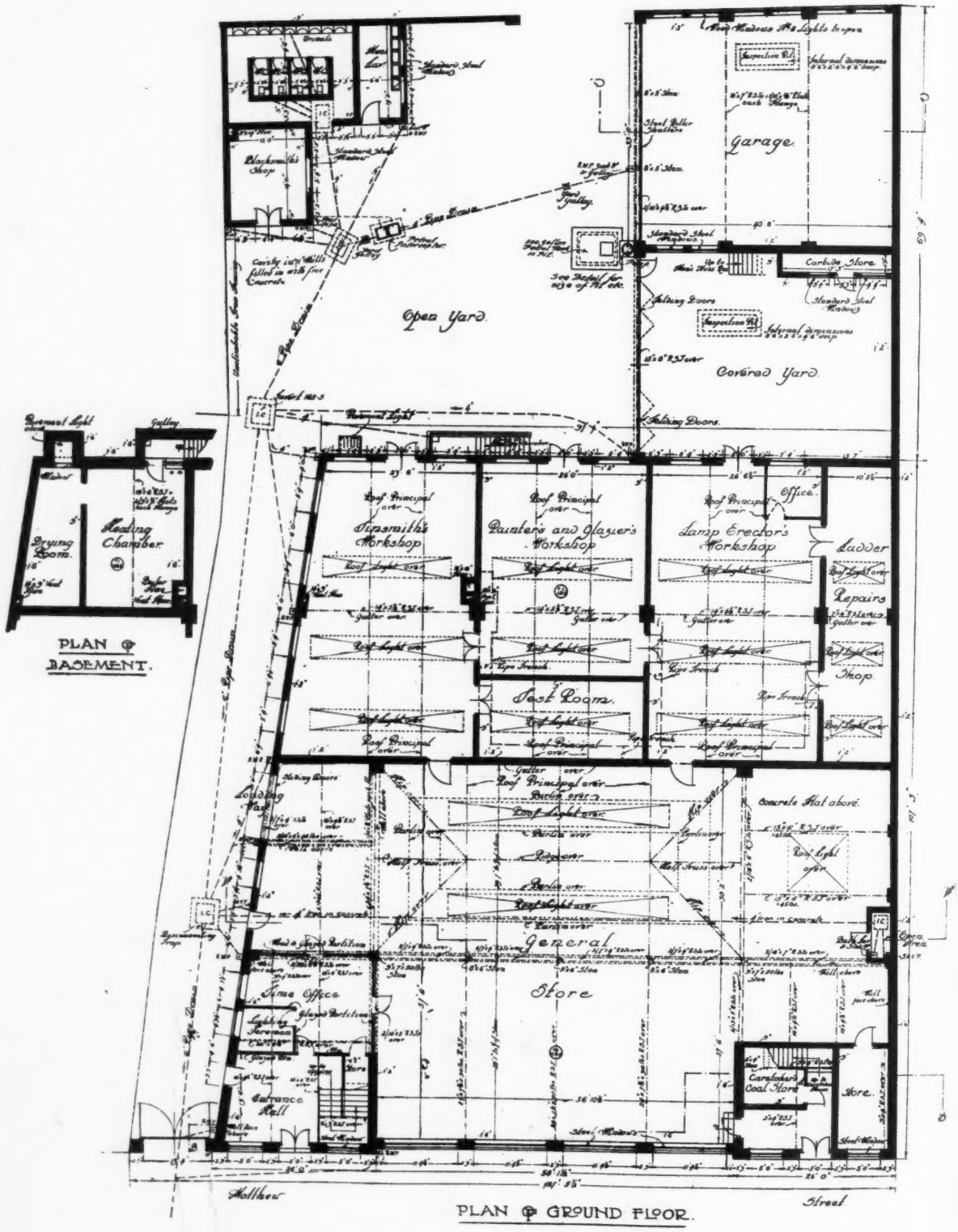
During the summer months the lamplighters are instructed to report all cases where the branches of trees obstruct the light from street lamps. A list is prepared of these obstructions and forwarded to the City Engineer with a request for him to arrange to have the trees trimmed.

Arrangements have to be carried out for the holiday season, as it is, of course, necessary to have a man available to take over the duties of one away on leave. For this purpose a special staff of relief men is employed, and they also take over duties of men away on sick leave. Each lamplighter has also a day off every 14 days to compensate for Sunday duty. A rotary system is operated, and again relief men are brought into service.

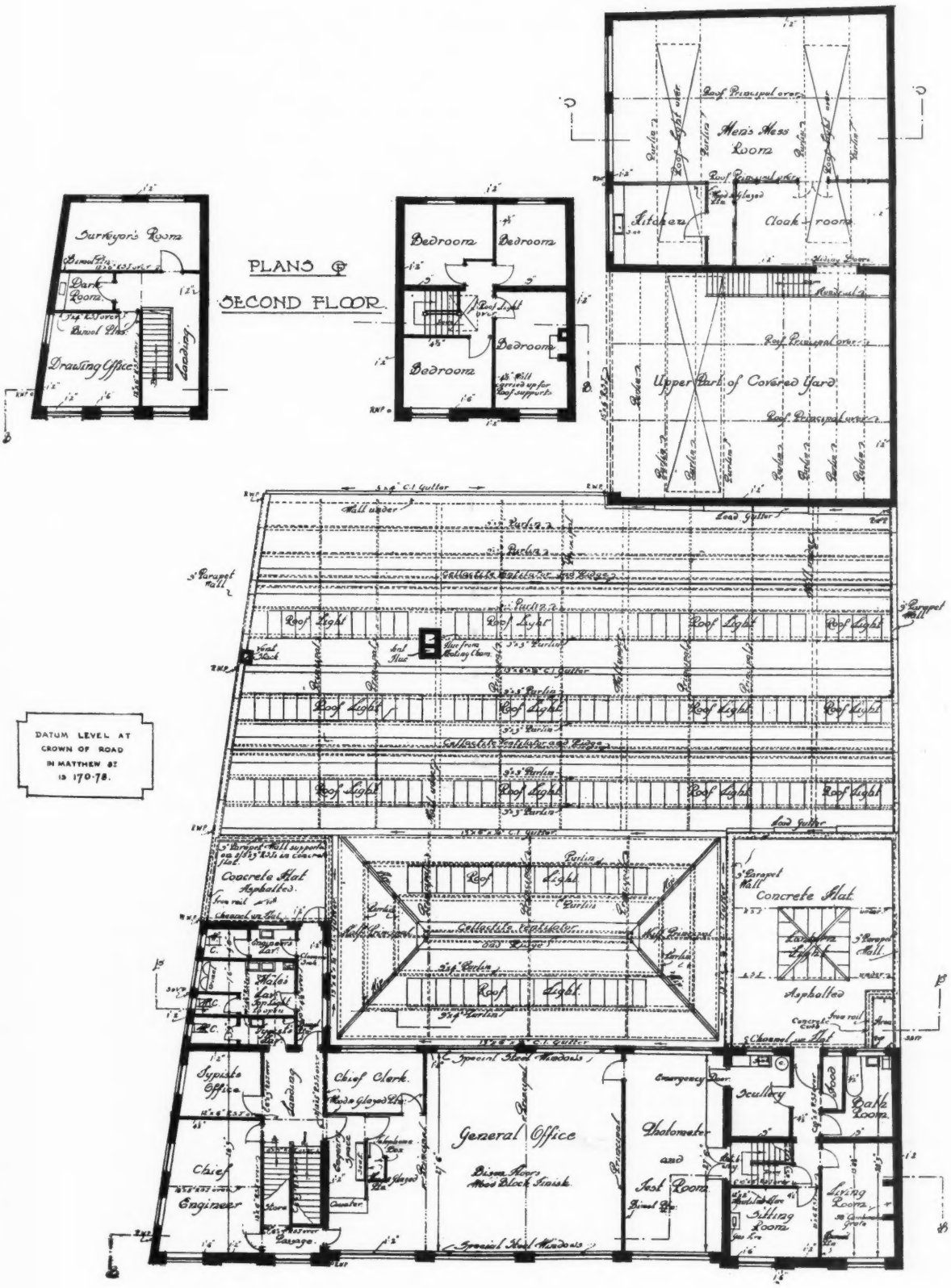
All the employees are issued with a uniform comprising a cap, cleaning jacket, reefer, trousers and overcoat. The cap, cleaning jacket and trousers are issued in April each year, the reefer in April every two years, and the overcoat in September every three years.

We are fortunate in having a well-equipped photometric laboratory in the department. Much useful data is obtained, such as the luminous output of gas and electric lamps. Polar curves showing the light distribution from various fittings are made, gas burners are tested for consumption, and gas mantles and electric lamps for durability and light production during life.

In 1924 the Sheffield Illumination Society was founded by Mr. Colquhoun. There is a membership of 103, all employees of the Lighting Department. Papers on street illumination, and work relating thereto, are submitted by members and others to



The Sheffield Corporation Public Lighting Department New Premises. Ground Floor and Basement.



PLAN @ FIRST FLOOR.

The Sheffield Corporation Public Lighting Department New Premises.
First and Second Floors.

assist in extending the technical knowledge in connection with the duties associated with the department. The Society is also instrumental in providing welfare activities and enthusiasm in this direction, for it is recognized that cheerful surroundings are a significant factor, and have a real influence on industrial relations.

Conclusion.

I trust that from these remarks I have made it clear that a street-lighting department demands constant attention. I realize that important factors such as the administration necessary to ensure that the street-lighting service is maintained to a high state of efficiency, the consideration of new lighting schemes, and the work carried out in the photometer room are merely referred to. It will be apparent that in the scope of a short paper it is impossible to do more than briefly review the subject, but I hope enough has been said to give some little idea of the necessity for scientific treatment in the work of a public lighting department.

DISCUSSION

Mr. E. J. Stewart (Glasgow), in opening the discussion, regretted that Mr. S. B. Langlands was unable to be present. Mr. Langlands, however, had read and enjoyed the paper, which presented an aspect of street lighting not usually considered at technical meetings. Public lighting was usually treated in a purely technical manner and from the illuminating engineering side. The paper made it clear that street lighting was not merely a question of so many foot-candles and illustrated how much work is involved in fitting up an installation and keeping it in good condition. The author had commented on the great amount of survey work involved before the actual installation is carried out. Some streets were far from ideal in many respects. One had to fit one's ideas to the local conditions. He presumed that the Lighting Engineer of Sheffield did not neglect the use of the tramway poles, but he did find that tramway poles were sometimes utilized to support lamps when unsuitable for that purpose, and neglected in cases where they may be found useful. Good survey work and efficient maintenance were both very important. It was necessary to have good workmen and good foremen, as well as a good organization and an efficient chief! The importance of the clerical side should also not be overlooked. Some might feel that the collection of information was carried too far, but he felt sure that Sheffield was making good use of all the information collected.

The paper was largely a collection of facts, and therefore not open to criticism, but there were some questions he would like to ask. These questions naturally applied to conditions in Sheffield, but the answers might help Glasgow. He would, for instance, like to have more information about the financial arrangements. Reference was made to the fixing of the amount of the City Rates for the half-year, but he was not aware whether the arrangements in England were the same as in Scotland. Perhaps Mr. Marrison would be kind enough to explain this. He would also like to know the extent of the private lighting, and whether this was encouraged by the Sheffield Corporation. In connection with the question of wages, he wondered if the use of time switches had made any material difference to this item. He noticed the high praise of work given to controllers, and would like to know if Sheffield found any difficulty in using clock controllers; also the hours of setting controllers and for what period. He admired the high percentage spent on Sheffield's new lighting plant. Had the new housing scheme and new streets given very much work to the street-lighting department? In his own case they found there was a tendency to spend money much more liberally on the streets than on the lighting. Did Sheffield find any difficulty in obtaining costs for repairing damage to street lamps through accidents?

Mr. Stewart also asked for the definition of the word "court." Did this mean the same in Glasgow? He was interested to notice that they had been lucky enough to be able to light two "courts" with one lamp. Referring to the system of fortnightly inspections, Mr. Stewart asked whether any provision was made for "surprise inspections." The question of providing for maintenance after lighting hours was a very important one.

Mr. Stewart emphasized the many departments interested in public lighting, referring especially to the co-operation of the local gas and electric-supply undertakings and the police. The work of the testing department was of unquestionable value, and it was of vital importance for cities to possess well-equipped lighting departments. Sheffield had every reason to be proud of their new premises; many other cities would like to have facilities as good.

In conclusion, Mr. Stewart expressed his appreciation of the paper, which he thought would be of considerable interest to public lighting departments throughout the country.

Mr. J. S. Dow said that, as Honorary Secretary of both the two societies participating in this meeting, he was especially interested in the paper, upon which Mr. Marrison was to be congratulated. It was encouraging to see the younger men coming forward in this way. If (as he understood) this was a maiden effort, the author had no reasons to be dissatisfied with it!

There were a few points in the paper upon which he would like to comment. He believed that a properly equipped lighting department with laboratories and workshops was well worth the expenditure involved, and he considered it very desirable that there should be a fully qualified and independent public lighting engineer in any town or city of any importance. The arrangements at Sheffield were exceptionally complete, but it was evident that expenditure on the laboratories, etc., had been amply repaid by the value of the services rendered. The diagram showing the analysis of cost of lighting was interesting. He noticed that costs of the supply of gas and electricity and of maintenance together formed only 40 per cent. of the total. Hence, if this item were increased, say 50 per cent., the total cost of the lighting could not be affected more than 20 per cent.; while, if a similar percentage change were made in the supply of gas and electricity *only*, the effect of a change would be still less evident. He pointed this out because of the widespread impression that if more gas and electricity were used for public lighting the lighting rate would have to be increased proportionally. Actually, as could be seen, the cost of the gas or electricity used was not a large portion of the total. Public authorities need not therefore be too parsimonious in connection with this item. It would, however, be helpful if rates charged by supply undertakings for gas and electricity used for public lighting could be made as low as possible, so as to encourage more generous use of them.

The number of mantles per nozzle had been reduced to a low figure at Sheffield. He had observed curious differences in this figure in different

towns and in different years—presumably owing to the variations in the nature of the burners, or exceptional climatic conditions. The substitution of the most modern and efficient types of burners and mantles was amply justified by the resulting lower maintenance cost. Mr. Marrison had explained the nature of the arrangements for the inspection of public lamps. At the recent National "Safety-First" Congress the necessity for prompt remedying of any defects that occur throughout the night had been emphasized. It was desirable to have special members of the staff on all-night duty to attend instantly to any defects of this kind, which might be a source of danger.

He understood that the co-operation of the police was very helpful in this and other ways in Sheffield. This led him to refer to the desirability of closer co-operation with Chief Constables with a view to getting statistics on street accidents and the relation of public lighting thereto. Some remarkable statistics had recently been collected for Edinburgh, where the number of accidents had actually *been reduced* during recent years, in a great measure owing to improved lighting devices and the introduction of luminous traffic control. At present very few data of this kind were available. Yet they were exceptionally important, as this was far the best means of impressing upon the general public the necessity for adequate street lighting.

Mr. Dow also remarked that Mr. Marrison had not said much in regard to the preparation of the annual report of the Public Lighting Superintendent. He recalled that Mr. Colquhoun's last report which was supplemented by numerous informative diagrams, was of a specially enterprising character. He would like to know whether there was any general ruling in regard to the contents and method of presentation of reports on public lighting, or anything in the nature of a specification with which such reports ought to comply? One other need he might mention: He had occasionally been consulted by local authorities and others who desired to have independent and impartial tests on street lamps in their locality. Apart from the National Physical Laboratory, which was hardly the body to undertake work of this description, he knew of scarcely anyone who could be invited to act in this way. He felt that it was rather an omission in the field of illuminating engineering that so few independent and fully qualified experts of this kind had been evolved.

In conclusion, Mr. Dow again congratulated Mr. Marrison on his comprehensive paper, which should prove of great interest to members of both the Illuminating Engineering Society and the Association of Public Lighting Engineers.

Mr. J. F. COLQUHOUN expressed his pleasure at the way Mr. Marrison had presented his paper. It was a creditable effort on which he wished to congratulate him. This paper was necessarily in the main a description of the work of a public lighting department, of professional interest, and useful for comparison with procedure elsewhere. He quite agreed with Mr. Stewart, however, that what was suitable for Sheffield was not always suitable for other cities.

The choice of the site for the new building in this case had been difficult. He had the offer of two sites—one in the centre of the town and a larger site further away—and chose the latter, partly because he desired to have the workshops on one floor. He was well satisfied with his decision. They were constantly making improvements. At the moment they had only three motor-vehicles, but they had room for a dozen. He was looking forward to the time when nobody at the department would need to walk—a desirable condition, as there was much to be done in a limited time. Already 50 per cent. of the inspection work was carried out by cars, which were, in reality, travelling workshops.

In regard to Mr. Dow's question on night service, they had in Sheffield a very extensive police-box system. When it occurred to him that this might be of use he asked the Chief of the Police to arrange with constables to report at once any faults found on their beats. This method had worked very well—in fact, the police had been almost too assiduous. The Public Lighting Department had been called upon at three o'clock in the morning in order that a broken pane in a lamp might be remedied. This, of course, was not necessary, but it showed how conscientious was the help rendered by the police, and how actively their survey was carried on.

Mr. E. L. DAMANT enquired in regard to the procedure after the completion of an installation following a survey report furnished by the staff. Were similar inspections made after a certain period with a view to ascertaining the value of the illumination on the street surface after the installation had been used for some time? He imagined that the actual variation might be considerably higher than the 50 per cent. allowed by the standard specification. He would also like to know whether any data illustrating the depreciation of gas and electric lighting over a given period, and assuming a certain value of illumination, were available. To what extent was such depreciation due to the variation of pressure?

Mr. A. CUNNINGTON enquired whether any experiments with selenium cells, to enable the lighting to be automatically switched on when the natural lighting dropped to a certain value, had been made in Sheffield. He imagined that such automatic methods of control would become increasingly common. He noticed with interest, and also with envy, that the Sheffield Lighting Department was able to separate entirely the installation department from the maintenance department. This was a very difficult point in connection with railway work. In his own department they had to carry out maintenance with only the surplus staff of the installation department, i.e., it was only when the men were not busy on installation work that they were released to help with the maintenance. He envied a department that had a section devoted solely to maintenance, which was apt to be handled elsewhere in a very haphazard manner—as there was always the excuse that other more urgent jobs allowed no time for this! Unless one could separate these sections sound maintenance work was scarcely feasible.

He agreed with Mr. Dow's remarks on the amount of money spent on actual lighting as compared with the total maintenance costs. It was almost invariably assumed that cost of lighting was merely a function of the amount of gas and electricity used and that no other expenditure was involved. He would now be able to quote the example of the Sheffield Lighting Department as showing the relatively small proportion which the fuel (whether oil, gas or electricity) formed of the total cost.

Mr. C. A. MASTERMAN congratulated the author on his paper. Although admirable in scope, it was somewhat difficult to comment upon. He was, however, interested in the engineering side, and would like to ask one or two questions. The paper did not say much about the use of governors. Were they used in Sheffield, and did they prove satisfactory? He noticed that no mention was made of the

B.E.S.A. Specification. He would like to know how far the lighting engineer, in preparing a scheme, worked in terms of the specification, and if there was any rough rules and regulations for the determination of the kind of lighting for certain kinds of streets. It was at present a puzzle to classify streets, and this was largely due to the fact that there was no real understanding in regard to the object of public lighting and no agreed basis for defining streets—in terms of traffic, for instance. At the present time there was much more traffic on the arterial roads going out of London than in suburban thoroughfares. Yet it was not unusual to find substantially the same lighting in both cases.

He would like to know whether testing was done in the same organized way as maintenance, and to have figures for these tests as compared with maintenance tests. He often asked himself why the man in the street was so little interested in street lighting. Perhaps it was due to the fact that those responsible for lighting the streets were not themselves interested. Sheffield showed, however, considerable interest in their own lighting arrangements.

Mr. H. C. BROWN expressed his interest in the paper, and wished to congratulate the author. He would like to know whether the method of cleaning by rota was adopted in Sheffield, also the length and time elapsing between each cleaning and the number of gas lamps treated. Were all the lamps mentioned examined in a stated time?

Mr. E. STROUD recalled the formation in 1924 of the Sheffield Illumination Society with 103 members, all employees of the department. He wondered if it would be possible to take in some others outside the staff with a view to extending local interest in illumination. He wished to congratulate Sheffield on their fine workshops, which he had seen in connection with the International Illumination Congress. The amount of work they could do was remarkable, and it almost seemed that ultimately they might be able to do without the manufacturer and prepare their own equipment!

Mr. W. J. JONES remarked that this joint discussion was a happy idea for both societies. He wished to endorse what had been said in regard to the great importance of having a fully qualified and independent man to control the Public Lighting Department. He had had an opportunity of examining the total cost of various lighting installations in boroughs and cities throughout the country. He could not believe that it was an accident that all those cities having a fully qualified man in charge were amongst those with the lowest street-lighting costs. He had been much struck by the care and attention to detail shown in every section of the lighting department at Sheffield. Their problems were not ordinary ones, and a great deal of ingenuity had to be expended in preparing appropriate layout and equipment. Mr. Marrison had referred to some of the difficulties on ensuring proper maintenance. The fact that accidents were ascribed to failures of lamps showed the importance of regular inspection and maintenance throughout the year. In conclusion, he wished to thank Mr. Marrison for his excellent paper.

Mr. G. H. WILSON added his congratulations. He was impressed by the account of the Sheffield Department, and felt sure that the next time any city wanted a Public Lighting Engineer they would have many applications! There were one or two questions he wished to ask. The cost of such a very efficient street lighting department as at Sheffield must be considerable, and he wondered if it had any material influence on the lighting rate. Were the burning-hours adopted for public lamps in Sheffield left to the discretion of the department? What proportion of lamps was allowed respectively to burn all night and was switched off at midnight? In regard to Mr. Cunnington's remarks on control by means of selenium cells he might mention the use of photoelectric cells of quite a different type. The amount of work necessarily done in the laboratory was doubtless very great. It occurred to him to ask whether some of this work could be cut out if reliable data could be obtained from the manufacturers of lighting equipment. He thought that if fuller data were generally supplied by the manufacturers some of the work could be reduced.

Mr. J. M. WALDRAM remarked that criticism was sometimes passed on work done on the drawing-board and in the laboratory. He would like to hear more of the testing work done in the streets, i.e., how far the planning of installations was supplemented by actual photometric tests of the performance of lamps when erected. Like other speakers he would be interested to hear how far the standard specification was applied in the work of a public lighting department. Experience in connection with maintenance might be of very great value to designers of lighting equipment, who had not always good opportunities of checking the results of their work in practice. Changes in design might have a material effect on maintenance problems, and at present little informative data on the effects of dust and dirt on various designs had been published.

Mr. P. P. WHEELWRIGHT expressed his appreciation of the informative survey of the work of a public lighting department which the author had prepared. He, too, was interested in the table of costs. He would like to know more of the nature of the contract in regard to costs of gas and electricity for public lighting; also the average candle-power of the lamps used. He imagined that the cost of the new buildings for the public lighting department must have been fairly high, and he rather wondered whether provision for this was made in preparing the percentage cost of public lighting.

The CHAIRMAN (Lieut.-Commander Haydn T. Harrison) endorsed what had been said in regard to Mr. Marrison's excellent paper. The discussion had been an interesting one. Many questions that he had intended to ask had been put by others. He would, however, like to emphasize what several speakers had pointed out—the fact that the cost of labour and maintenance was a relatively large item as compared with the cost of the gas or electricity used. He would like to see these various items (fuel, lighting equipment, renewals and labour) separated in an analysis of cost of street lighting. It would then be seen how the cost of the fuel became an insignificant fraction of the whole, and how short-sighted it was to economize unduly in this item.

The apparently high margin allowed in the standard specification surely illustrated the importance of efficient maintenance. When the specification was first issued the allowance of 50 per cent. was regarded by some as high. But in actual fact one found that it was, if anything, too small. On the efficiency of the public lighting department and their maintenance staff depended what the illumination ultimately became in practice. He had recently asked several friends who travelled a great deal to name a number of towns which in their opinion were adequately lighted or fairly well lighted. Of the ten towns selected by them, seven possessed independent public lighting engineers. This was surely more than a coincidence!

He was glad to see that Mr. Marrison had made an effort to analyse the main objects of street light-

ing. He himself had never been able to find a really satisfactory definition of good public lighting. Its main purpose was usually assumed to be the assistance of traffic, but the importance of this factor varied immensely in different classes of streets. People were inclined to overlook the direct interest of the police in public lighting. A careful classification of streets, and the purposes to be served by lighting in each case, was much to be desired.

Mr. E. MARRISON, in reply, expressed his appreciation of the reception of his paper and the kind references made by many speakers in the course of the discussion. In the time at his disposal he would try and reply to a few of the numerous questions that had been asked; others he must leave to his Chief (Mr. J. F. Colquhoun) to answer.

Mr. Stewart had enquired in regard to the use of tramway poles. It was sometimes possible to get the Tramways Department to alter the position of their poles so that they served equally well the trams and the lighting. It was recognized as important that the number of street obstructions should be kept to a minimum.

With reference to the procedure regarding finance. It was usual at the end of the half-year for the City Treasurer to ask for details of expenditure, and whilst there was never much money to spare, they had hitherto had no difficulty in getting what was necessary for their needs, as the value of the services rendered by the Public Lighting Department was well understood.

In Sheffield at present they had practically no private lighting, and, generally speaking, they did not encourage lighting of this kind.

Control and time switches were extensively used, and their adoption has led to a material diminution in the wages bill. In Sheffield, as elsewhere, new housing schemes had been developed, and this naturally made a big demand on the money available. There was in fact a tendency for expenditure in this direction to lead to the holding up of schemes for the improvement of public lighting, which were deferred until more money was available.

When damage had been done to lighting equipment there was usually no great difficulty in getting the money repaid.

Lighting inspectors patrolled the streets at night, and when any failure was observed it was immediately dealt with. If the fault was a mains fault it was 'phoned through to the supply undertaking, who at once put the matter right. Surprise inspections were constantly being carried out by the lighting inspectors.

Mr. Dow had referred to the question of the consumption of mantles per nozzle. In Sheffield they had been able to reduce this figure progressively (the present figure being 2.6 mantles per nozzle per annum, which was a very satisfactory result).

Regarding the procedure after the completion of an installation, illumination tests were taken from time to time by means of a lumeter.

Experiments with selenium cells had been made in Sheffield for the control of public lighting, but whilst these devices gave satisfactory results there did not seem to be any great object at present in adopting them in place of time switches. Governors were generally used, and answered well.

He should explain that the Sheffield Illumination Society was a small society formed in connection with their own department. A few contractors from outside had originally joined, but their own organization met their requirements, so that the membership of the Society was now confined to the staff of the Public Lighting Department.

Reports on Public Lighting

WE have before us two annual reports on public lighting—those presented by Mr. J. F. Colquhoun, Public Lighting Engineer to the City of Sheffield, and by Mr. Isaac H. Massey, Superintendent of Street Lighting in Oldham.

No very noteworthy changes seem to have been made in the lighting of Sheffield, though 638 electric lamps have been added. We note that in two streets (the Moor and Pinstone Street), the effective illumination has now been doubled. Attention is drawn to the value of reflectors of "Staybrite" steel (a Sheffield product) in improving the distribution of light from gas lamps. The average number of mantles used per nozzle per annum in Sheffield is 2.629, and the average effective life of mantles in the streets 1,419 hours. In the case of electric lamps the average life was 1,051 burning hours. The extension of automatic control has been continued. There are now 12,842 gas lamps mechanically controlled, and 245 time switches operate 4,384 electric lamps.

The report contains an account of the new premises, occupying nearly 16,000 square feet of floor area. The photometric laboratory equipment appears to be exceptionally complete, and its advantages for the testing of gas and electric lamps and fittings is emphasized. In this connection it is remarked: "It is of first importance to the Department that we are now equipped with apparatus which allows us to put measurable and certifiable facts on illumination against uninformed assertions which unfortunately are so prevalent on lighting matters, and particularly on street lighting." (A hard saying!)

An admirable feature of the report is again the series of graphs which tell the story at a glance. Thus it is shown that whilst the cost of lighting per head has remained practically constant in the neighbourhood of 28d. to 29d. per head of population during the period 1926-1932 the candle-power per head has risen from 3.27 to 4.38. In the meantime the cost per candle per annum has also fallen. In 1923-4 it was 2s., and is now only 6¼d. Other diagrams illustrate the numbers of gas and electric lamps in use and the development of automatic control.

Mr. Massey's summary of events in Oldham is likewise a chronicle of steady progress in detail. Extensions in street lighting are less numerous than in past years, as there has been a slackening of new building and housing schemes. Gradual increases in efficiency, without increases in consumption of gas and electricity, have been aimed at. Large lanterns have been substituted for small ones that were, in many cases, defective and incompletely weatherproof. New lanterns embodying high-efficiency reflectors have been fixed in 50 secondary streets, and directional reflectors have been fitted to numerous burners throughout the town. Restriction of street lighting during the summer to 66 per cent. of normal was commenced on May 1st, and appears to have given rise to few complaints.

The report is supplemented by descriptions of the meeting of the International Illumination Congress in Edinburgh and of the floodlighting in London, where the treatment of the Horse Guards and of St. James's Park are mentioned as of special interest.

The suggestion has been made that some form of schedule or specification, with which reports on public lighting should comply, would be useful; but a certain freedom of action and individuality, as revealed in these reports, is an advantage too.

The Illuminating Engineering Society

(Founded in London, 1909; Incorporated 1930.)

ANNUAL GENERAL MEETING

(Held at the House of the Royal Society of Arts, 18, John Street, Adelphi, London, W.C.2, at 6-30 p.m. on Friday, June 17th, 1932.)

THE Annual General Meeting of the Illuminating Engineering Society was held at the House of the Royal Society of Arts (18, John Street, Adelphi, London, W.C.2), at 6-30 p.m., on Friday, June 17th, the PRESIDENT (Sir Francis Goodenough, C.B.E.) in the chair.

After the minutes of the last meeting had been taken as read, the Hon. Secretary read out the names of applicants for membership, which were as follows:—

Corporate Members:—

Chapman, A. E. .....Engineer, Messrs. Violite* Ltd., 41, Great Windmill Street, Piccadilly Circus, London, W.1.

Holton, A. L. .....Chief Gas Engineer, Gas Department, Corporation of Manchester, Manchester.

Country Member:—

Jones, T. S. .....Electrical Illuminating Engineer, 37, St. Alban Road, Westbury Park, Bristol.

The names of applicants presented at the last sessional meeting of the Society* were read again, and these gentlemen were formally declared members of the Society.

At the request of the President, the HON. SECRETARY (Mr. J. S. Dow) then presented the Annual Report of the Council (see pp. 182-185). Mr. Dow explained that, as this report had been circulated to all members of the Society, an account of its contents was unnecessary. He would, however, just like to draw attention to one or two salient features. The past year was by common consent one of unprecedented industrial depression. Nevertheless, during this unfortunate year the International Illumination Congress had been carried through with complete success, and the Society had itself (1) obtained more new members than in any previous year, (2) fully maintained its annual income, and (3) entertained at its annual dinner a record attendance, the 200 mark being passed for the first time. In addition to this material prosperity, the work of the Society was continually extending, and there should, in the future, be increased opportunities for service on the part of the rank and file of the membership. (Applause.)

This resolution, having been put to the meeting, was declared carried unanimously.

The following resolution was then moved by Mr. C. A. MASTERMAN and seconded by Capt. W. J. LIBERTY, both of whom expressed their appreciation at the progress of the Society and its improved position:—

"That the Report of the Council for the session 1930-31 and the accounts of the Illuminating Engineering Society for the period from January 1st, 1931, to December 31st, 1931, be hereby adopted, and a vote of thanks be extended to the President, Council and Officers for their efforts on behalf of the Society during the past session."

The following resolution was proposed by Mr. J. G. CLARK, seconded by Mr. A. BLOK, and also carried unanimously:—

"That this meeting records its appreciation of the services of Messrs. Robert J. Ward & Co., as auditors of the Society, and approved of their re-election for the next session."

The PRESIDENT then delivered his address (see pp. 179-181) which consisted in part of a review of the early history of the Society and of recent developments in its activities, and in part of an analysis of education in illuminating engineering, especially in relation to staff education and service to the consumer.

The address was listened to with great interest by those present, whose feeling of appreciation was aptly expressed by Lt.-Col. KENELM EDGCUMBE and Mr. C. C. PATERSON, both past Presidents of the Society.

Lt.-Col. KENELM EDGCUMBE, in proposing a hearty vote of thanks to the President for his interesting address, remarked that this was the first complete Presidential Address which the Society had had for some years, recent Presidents having, like himself, escaped this duty. He felt sure all present would join him in exonerating Sir Francis for non-attendance at past meetings, and in congratulating him on his restoration to health. They would also agree that the address which they had heard that evening was worth waiting for. The attendance was surely a reflection of the esteem in which the President was held. The more he (Lt.-Col. Edgcumbe) knew of Sir Francis, the more he studied his work, the greater his appreciation had become. He was only amazed that he had entered the gas industry and that the electrical industry had allowed his services to be lost to them! In conclusion, he had again much pleasure in proposing a very cordial vote of thanks to the President for his interesting address.

Mr. C. C. PATERSON said it gave him great pleasure to second the resolution which Lt.-Col. Edgcumbe, had put before the meeting, to which he asked the audience to accord their wholehearted support. The address was full of thought and wise counsel to the Society. Sir Francis had mentioned the early days when presidents were not always available: in those days he was always ready to fill the breach, and was one of the greatest supporters of the Society throughout that period. It had been a pleasure to members to witness the important position since attained by him. He was glad to observe that Sir Francis had chosen as one of the principal topics of his address the subject of "Daylight Illumination." Whilst all members of the Illuminating Engineering Society were naturally impressed with the importance of artificial illumination, they should not forget the enormous strides made in this country towards reaching standards for daylight illumination. In the future, he thought, we should look back with pride to the great pioneering work done in this field. He had the greatest pleasure in seconding the vote of thanks. (Applause.)

The PRESIDENT briefly thanked the proposer and seconder of the vote of thanks for their very flattering remarks, and the audience for the very cordial way in which these had been received. He had never regretted his decision to enter the gas industry, and if he had his time over again he would not change! He had been gratified to see such a good attendance on such a fine summer's day, and he was also glad to think that he had been able to get through the business expeditiously and release them to enjoy it!

* *Illuminating Engineer, June*, 1932, *p.* 152.

Presidential Address

By Sir FRANCIS GOODENOUGH, C.B.E.

(Address delivered at the Annual General Meeting of the Illuminating Engineering Society, held at the House of the Royal Society of Arts, 18, John Street, Adelphi, London, W.C.2, at 6-30 p.m., on Friday, June 17th, 1932.)

I SHOULD like first of all to place on record my sense of the great honour done by the Society in electing me as its President for the year immediately following the International Illumination Congress, which did so much to arouse interest in this country in the problems of artificial illumination, on which there is still all too much indifference and ignorance. I much regret that circumstances beyond my control have prevented me from giving to the Society during my year of office all the time and energy that its importance deserves and from carrying out the desire of the Council that the President should give his address early in rather than towards the end of his occupancy of the chair.

A visit to America, followed by a rather long illness, made fulfilment of that desire impossible, and I hope I shall be forgiven for my belated appearance to address you as President to-night. I should like to take the opportunity of recording my indebtedness to the President of the American Illuminating Engineering Society (Mr. Julius Daniels, of Boston) for the courtesy and hospitality he extended to me on the occasion of my visit to the States, where unfortunately the Convention of the American Gas Association, which I went over to attend, clashed with the "Silver" or Twenty-fifth Annual Convention of the American Illuminating Engineering Society, so that I could only send them on your behalf and my own a cordial message of greeting and goodwill.

A president in framing his address has two main alternatives. He may attempt a general survey of the Society's activities and progress, or he may devote himself to some phase of its work in which he personally takes a special interest, or some topic on which he has special knowledge.

Perhaps I may be allowed to combine the two methods—to spend a little time in recalling what the Society has done since its inception 23 years ago, and reviewing its hopes for the future, and then to refer briefly to two subjects in which I am deeply interested, namely, service to the customer and the education of the service personnel.

My own interest in the Society goes back to its very commencement for I, like my immediate predecessor in the Presidential chair (Lt.-Col. Kenelm Edgcumbe), was one of the party that assembled at the Criterion Restaurant on February 9th, 1909, when the decision was taken to form the Illuminating Engineering Society. It is common knowledge that the initiative in this project sprang from the late Mr. Leon Gaster, our founder, who has recently been commemorated by the formation of the Leon Gaster Premium, awarded for the best paper read before the Society each year. It is perhaps not so commonly known, though it is well known to all who have been closely associated with the Society's work, how much of its success all through has been due to the indefatigable, unselfish and able work of our Hon. Secretary of to-day, Mr. J. S. Dow, whose services to the Society it would be difficult to estimate, and I am glad of this opportunity of bearing my testimony to that fact.

Producer and User.

Those who wish to get some insight into the ideas of those responsible for the founding of our Society cannot do better than study the admirable inaugural address delivered by our first President, Professor Silvanus P. Thompson, at the opening meeting, on November 18th, 1909. While we have made considerable progress, we are still preoccupied with many of the problems to which he alluded. We have consistently tried to carry out the aim he emphasized —an aim which is particularly associated with our Society—of acting as a link between the producers of light and the user, and of affording a rallying point for the varied army of persons, "mostly professional men, not middlemen in the industrial sense, but persons who are concerned with the intermediate questions of distribution and utilization, for whom no professional name has hitherto existed."

The Human Element.

I may perhaps emphasize this function of our Society of acting as a link between the producer or expert and the (generally inexpert) user because of its bearing on the educational problems to which I shall refer later. Illuminating engineering is in truth different from any other field of engineering in that the "human element" enters into it in a very special degree. In many fields of lighting the problems involved in the implements and machinery of illumination, the tools of our trade, are almost of secondary consequence in comparison with the much more difficult and intricate problem of satisfying human needs and desires, possible human whims as well. After all, the real test of successful lighting is whether it satisfies the man or woman who has to make use of it; and the expert, especially in dealing with complex industrial processes, can often glean a useful hint from the user, even if it may require patience to disentangle the crucial point that is perplexing him.

A Common Meeting Ground.

Apart from its value to the user of light, our Society has fulfilled the valuable function of affording a common meeting ground for those associated with different methods of lighting, who are invited—and with notable success contrive—to leave behind the rivalries of ordinary business life, and to unite in the study of problems of common interest and in friendly intercourse on topics that concern all those who are engaged in the honourable task of furnishing light to mankind.

In one other respect our Society is unusual amongst engineering bodies. As yet it does not seek to impose professional qualifications. It is an "Illuminating Engineering Society," not a "Society of Illuminating Engineers." It welcomes all interested in promoting better lighting, and for some time to come its members will continue to be, as Professor Thompson once phrased it, "engaged in a career of self-education."

Illuminating engineering is, indeed, a new profession. Lighting equipment and knowledge of its

application are progressing from day to day. We have learned a very great deal during the past twenty years; but it may perhaps be some time yet before we feel in a position to form an inner circle of "illuminating engineers" with full qualifications from among the numerous members with expert but varied and perhaps incomplete knowledge who are to be found amongst us.

Early Meetings.

The early meetings of the Society, following Professor Thompson's address, dealt with two subjects of fundamental importance, "The Nature of Glare: its Causes and Effects," and "The Measurement of Light and Illumination." Though we know much more about glare than we did in 1909 we are still grappling with this problem, and even to-day we have not evolved what we really need—a simple form of test whereby it may be recognized at a glance whether an installation is glaring or not. In the second subject we have made better progress. When our Society was formed the number of people who understood what was meant by a "foot-candle" was limited, and there were but a few primitive instruments for measuring illumination, and the use of these was mostly confined to a few enthusiasts such as another of our past-presidents, my good friend Mr. A. P. Trotter, who has been aptly described as the "father of illumination photometry" in this country. At the present time we have many useful instruments, the requirements of which have been embodied in a standard specification, and we could if possible furnish quite an array of workers familiar with their use.

Early meetings of the Society were devoted largely to acquiring knowledge of conditions of illumination in different types of buildings. I have myself a keen recollection of measurements taken in various schools and in connection with my own paper on the lighting of printing works. I recall that the former investigation led to the formation of a joint committee to deal with the lighting of schools, which issued an excellent report shortly before the war. Most of the conclusions of this committee still stand. In the revised report recently issued, however, the minimum illumination on desks in schoolrooms has been raised to 5 foot-candles—a step which I view with gratification, as I was one of the minority who thought the original recommendation by the Committee of 2 foot-candles too low!

Links with Other Bodies.

There were other committees that did excellent work in those early days, although more recently such work has expanded so greatly as to be beyond the scope of our Society alone. Surely not the least of the services that the Illuminating Engineering Society has rendered is the manner in which it has acquiesced in and assisted efforts by other organizations, so that the circle of bodies interested in illumination is continually extending.

Amongst such bodies may now be mentioned (1) the Illumination Research Committee of the Department of Scientific Research, which deals mainly with researches beyond the scope of private persons and ordinary societies; (2) the National Illumination Committee of Great Britain, with its numerous series of committees interested in lighting problems mainly from the national and international standpoint; (3) the British Engineering Standards Association, which, as its name implies, deals with standardization in illumination; and (4) the National Physical Laboratory, which has served so often as the executive when experimental work in connection with the above committees was desired.

Yet other bodies who have helped and are helping with specific researches are the committees of the Medical Research Council and the Industrial Health Research Board, which co-operate when problems of a hygienic or physiological nature arise.

All these organizations are closely interlinked, and there is no overlapping of work. Leading members of the Illuminating Engineering Society serve on many of these committees, and our Society can take pride in the fact that it does, through its members, take a large share in the work going on, and rejoice at the fact that this work has developed so rapidly as to be beyond its own resources. It does, in fact, still serve as the connecting link between all these and other organizations, which might be graphically represented by a series of particles linked like electrons to the core of the Illuminating Engineering Society at the centre.

Educative Work.

The Society retains as its most important function the dissemination of information on illumination. Yet even here it recognizes and co-operates with other organizations, such as the British Commercial Gas Association and the E.L.M.A. Lighting Service Bureau, both of which are responsible for excellent educational work in connection with the illuminants which they respectively represent.

Public Lighting.

One more development in this country may be mentioned, namely, the formation of a special professional body to deal with street lighting—the Association of Public Lighting Engineers. Yet, even in this case, co-operation is aided by the happy circumstance that the Illuminating Engineering Society and the Association of Public Lighting Engineers possess the same honorary secretary!

Sufficient has been said to show that this country is particularly happily situated in its machinery for studying illuminating engineering. Indeed, one can hardly think of another in which various fields of work have been parcelled out in the same complete manner, and where the various operating agencies are linked together in such a happy understanding. The conditions in this respect did, unquestionably, help enormously in facilitating the organization of the International Illumination Congress, which is fresh in the minds of all of us, and which owed so much of its success to the splendid work done in this country by a small band of devoted workers under the able leadership of Mr. C. C. Paterson.

International Progress.

Undoubtedly the most striking development of all, during the past twenty years, has been the steady growth of international interest in illumination. The first Illuminating Engineering Society to be formed was that in the United States (1906). Our own Society (1909) was the first to be formed in Europe. Similar bodies have since been formed in Germany, Japan, Austria, Holland and France (mentioned in order of date). The very latest recruit is the Illuminating Engineering Society of Australia, formed in 1931. But even in countries where no formal Illuminating Engineering Society exists, organizations for the study of lighting problems and the dissemination of information thereon have been developed. Instructive evidence of this was given at the recent Congress.

Daylight Illumination.

There is a point to which I should like to call special attention before passing from the past and present to the future, and that is the point that the science of illumination and the practice of illuminating engineers is by no means confined to the problems of artificial illumination, but include the very important problems of natural (daylight) illumination. When one considers that much more of the work within buildings is carried on during hours of daylight than during hours when artificial lighting is required, the importance of the problems of daylight illumination becomes obvious, and the medical profession, by calling our attention forcibly in recent years to the hygienic value of sunlight, has done much to emphasize that importance, well realized by the Greeks and Romans 2,000 years ago.

I think it is therefore a matter of much congratulation to this Society that the work it has done from its inception to direct attention to and secure investigation into the problems of daylight illumination should have resulted, after many days, in the adoption of resolutions at Cambridge last September embodying agreement upon a standard of adequacy of daylight illumination in interiors for ordinary purposes comparable with clerical work, and recommending systems of measurement, predetermination and representation.

Guidance for the Architect.

Formerly, when asked for a simple definition of inadequate daylight for ordinary purposes the doctor promptly passed on the enquiry to the architect, who in his turn referred it to the meteorologist who, after careful consideration, pronounced it to be a question for the medical profession. Now, at length, decisions have been arrived at that have broken that vicious circle and architects have some practical guidance for dealing with a highly important and very practical subject. They are to-day in a position, as they never were before, to determine without difficulty precisely how much adequate light will be secured by any given limitation of permissible height and density of new buildings, or, alternatively, precisely what limitations are necessary to avoid any given degree of inadequacy. Above all, they have, at last, an accepted and simple definition of inadequacy, as to which it was previously possible to hold innumerable opinions.

It is only just to place on record here the fact that the standard of insufficiency now internationally agreed was originally suggested 23 years ago by a British architect and a much-honoured member of this Society, Mr. P. J. Waldram, and as the result of much valuable evolutionary work by him was embodied in British case law in 1922, and was recommended for international acceptance after exhaustive tests by the National Physical Laboratory. It was essentially a British problem because of British law, based on the ancient Roman law of light. We may rejoice that it found its solution through British effort.

And now what of the future of our Society? We have been engaged for over 20 years in the "career of self-education" predicted by our first President, and during this period we have certainly learned a great deal. We find ourselves to-day in a much better position than when we began to insist upon the advantages of good lighting and to explain in what "good lighting" consists.

Our immediate aim should be, it seems to me, to extend our circle of influence. Our membership has been steadily growing, but it ought to be very much greater than it is. Tentative efforts towards the holding of meetings in provincial centres have been made. Cannot these be followed up by a definite attempt to form groups or local centres in various cities to carry on the good work?

Local Centres.

More should be done to establish courses of lectures on illumination at leading colleges and institutions. Our Society has done more pioneering work in this direction than is commonly known. In 1911 a series of twelve lectures, each by a member of the Society having special knowledge of the subject, was arranged at the Regent Street Polytechnic, and was duplicated at other educational centres. Occasional courses of this kind should be easier to arrange and should appeal to much larger numbers now. Indeed we may go further and advocate regular courses at certain institutions—especially in connection with the training of architectural students.

Our Society should also make every effort to secure the help of supply undertakings, the more progressive of which now recognize the necessity of establishing departments competent to give advice on lighting and to interest consumers in the efficient use of artificial illumination.

The Importance of Staff Education.

This brings me to the subject of service to the customer, to which I attach great importance. The user of artificial illuminants needs expert advice and education upon the form and type of installation best suited to his particular requirements and taste, and so does his adviser on construction, decoration and upkeep, the architect; and the persons most generally who have the opportunity, or should see to it that they get the opportunity, of giving such advice and providing such education are the suppliers of artificial illuminants.

It is, therefore, of primary importance that the gas and electricity supply industries should provide themselves, either individually or collectively, with staff who have been educated in the general principles of illuminating engineering and their practical application and are capable of expounding those principles to and discussing their applications with either the users of light themselves, or their builders and architects.

The Study of the Commodity.

Education for commerce, when it comes to the theory and practice of a trade or industry, necessarily includes a study of the commodity or service which is for sale. This can be provided either by the trade through internal machinery or by the local education authorities in co-operation with the organizations of the trade or its individual units. Personally, I believe that the best results at the lowest cost to the employer can be secured by the second alternative. But whichever the plan adopted, it is essential that employers should take a close and constant interest in the matter. Such an application of science to industry and commerce is definitely called for, and would be definitely profitable alike to the trade, to the consumer and to the community.

In conclusion, let me say that I regard the work of the illuminating engineer as of outstanding importance. There is literally no one who does not need light, natural or artificial, and the object of this Society is to induce people to hold scientific illumination in higher esteem, and not to think of it only as something upon which it is essential to economise. That is one of many reasons why I am proud to have been its President and why I wish it continued and ever-increasing success in its service to the community.

Report of the Council for the Session October, 1931, to June, 1932

(Presented at the Annual General Meeting of the Illuminating Engineering Society, held at the House of the Royal Society of Arts, 18, John Street, Adelphi, London, W.C.2, at 6-30 p.m., on Friday, June 17th, 1932.)

THE Council is happy to be again able to report progress in the work of the Society and continued improvement in its position. The past session has coincided with a period of general industrial depression which has naturally imposed difficulties in some directions. On the other hand, the fact of the International Illumination Congress having been carried through with such conspicuous success, in spite of these difficulties, has served as a great encouragement, and the Congress was undoubtedly the means of stimulating public interest in the Society's work.

Election of Officers and Council for Next Session.

In accordance with the procedure outlined in the Articles and By-laws of the Society, the nominations made by the Council to fill vacancies have been published in *The Illuminating Engineer** and circulated to all members, who were thus afforded an opportunity of making additional nominations if they so desired. No new nominations having been received those nominated by the Council are now automatically elected.

Accordingly Lt.-Commander Haydn T. Harrison will become *President* for the next session; Mr. A. W. Beuttell will become *Vice-President*; Mr. J. S. Dow and Mr. J. Wyatt Ife will continue as *Hon. Secretary* and *Hon. Treasurer* respectively.

The following members will fill vacancies on the Council: Mr. A. Cunnington, Mr. R. S. Downe, Col. C. H. Silvester Evans, Mr. C. Hughes, Mr. W. J. Jones and Mr. C. A. Masterman.

Work of Committees.

The three main standing Committees of the Society were constituted as follows:—

General Purposes Committee: Sir Francis Goodenough (President), Mr. J. S. Dow (Hon. Secretary), Mr. J. Wyatt Ife (Hon. Treasurer), Mr. L. E Buckell, Mr. F. W. Purse and Mr. H. Hepworth Thompson.

Papers Committee: Dr. S. English (Chairman), Mr. A. Cunnington, Mr. J. S. Dow, Mr. W. J. Jones, Mr. Howard Robertson, Mr. J. C. Walker and Dr. John W. T. Walsh.

Technical Committee: Mr. A. W. Beuttell (Chairman), Mr. H. Buckley, Mr. J. S. Dow, Dr. S. English, Lt.-Commander Haydn T. Harrison, Mr. W. Millner, Mr. E. L. Oughton, Mr. Howard Robertson, Mr. J. C. Walker and Mr. H. C. Wheat. *Co-opted*: Mr. W. J. Jones, Mr. C. A. Masterman, Mr. T. E. Ritchie and Mr. G. H. Wilson.

A supplementary Committee to deal with Membership and Development has also been appointed, and has already done useful work. This Committee is constituted as follows:—

Membership and Development Committee: Mr. H. T. Young (Chairman), Mr. A. W. Beuttell, Mr. J. S. Dow, Mr. W. J. Jones, Mr. C. Morley New and Mr. E. L. Oughton.

It was mentioned in the last Report of the Council that the Sub-Committees of the Technical Committee engaged in the revision of the original reports on School Lighting and Library Lighting had almost entirely completed their tasks, and the hope was expressed that the revised reports would be issued very shortly. This hope was fulfilled almost immediately after the Annual Meeting. Revised reports on the Lighting of Schools (both natural and artificial and on Library Lighting have appeared in the official journal.† Both aroused considerable interest. The reports on School Lighting have been in constant request, and many copies have been furnished to school authorities. By arrangement with the Library Association, the Report on Library Lighting was specially reprinted and included in the official bulletin, which is circulated to all members of that Association.

The publication in the journal of a new section—"Literature on Lighting," consisting of abstracts of the chief articles on illumination and photometry that have appeared in the technical press during the preceding month—has been continued and now forms a regular and valued feature in the journal. Abstracts are prepared under the supervision of various members of the Technical Committee. The Technical Committee has also again made itself responsible for the preparation of the Annual Report on Progress, presented at the opening meeting on October 20th, 1931, which promises to become more comprehensive and informative year by year.

The Technical Committee is now engaged upon various other enquiries, chief amongst which is the preparation of a series of recommended values of illumination for use in various classes of buildings.

The newly formed Membership and Development Committee has so far devoted itself mainly to the task of broadening the basis of the list of Sustaining Members, and has already been successful in gaining the support of a number of gas and electrical supply undertakings throughout the country.

The Leon Gaster Memorial Fund.

The administration of this Trust, the completion of which was recorded in the Report of the Council for last session, has proceeded quite smoothly. A statement of income and expenditure is appended.

The first award of the Leon Gaster Premium of ten guineas was made during the past session, to Mr. H. T. Young for his paper on "Modern Domestic Lighting," read before the Society on March 19th, 1931.

Meetings of the Society.

At the opening meeting of the session, which was held on October 20th, 1931, the Report on Progress prepared by the Technical Committee was, as usual, presented. The report again contained an informative survey of recent developments, and was supplemented by a varied series of exhibits illustrating recent developments in illuminating engineering. These exhibits included apparatus for the determination of daylight factors, new sources of ultra-violet radiation, displays of architectural lighting and new types of signs and lighting fittings.

The second ordinary meeting, held on October 30th, 1931, was arranged specially in order to afford an opportunity for the discussion of the floodlighting undertaken in connection with the International Illumination Congress. A paper on this subject, illustrated by numerous lantern slides and models of buildings, was read by Mr. Percy Good (Chairman of the London Committee),

* March, 1932, p. 64.

† *The Illuminating Engineer*, July, 1931, pp. 155-161.

and was followed by an interesting discussion in which a number of architects took part.

For the third ordinary meeting, held on November 18th, 1931, members of the Society were the guests of the Worshipful Company of Tallow Chandlers in their City Hall. The evening was devoted to three addresses reviewing historical developments in lighting—by Mr. R. H. Monier-Williams, Clerk to the Company, on "The Tallow Chandlers' Company and their Craft"; by Mr. W. J. A. Butterfield, on "The Historical Development of Gas Lighting"; and by Mr. J. Swinburne, on "The Early History of the Electric Light." All three addresses were of more than ordinary interest. After suitable acknowledgment of the hospitality of the Tallow Chandlers' Company had been made, members were afforded an opportunity of seeing over the building, which contains many objects of historic and antiquarian interest.

On January 8th, a paper on "Motor-Car Headlights" was read by Mr. E. S. Calvert. The following meeting, on February 19th, was devoted to a discussion on "The Lighting of Churches and Cathedrals," contributions being presented by Mr. H. C. Wheat, Mr. Howard Robertson, Mr. E. Stroud, Mr. R. O. Ackerley and others. Subsequent papers were read on March 18th, by Mr. F. E. Rowland on "The Application of Electric Light to Agriculture," and on April 26th by Mr. E. H. Penwarden on "Progress in Decorative Lighting," a feature of the latter paper being the very complete series of lantern slides illustrating developments in fixture design since 1913 (when the subject had last been fully treated before the Society in a paper by Mr. F. W. Thorpe).

The final event, on May 24th, was a paper on "The Work of a Public Lighting Department," by Mr. E. Marrison, which was read before a joint meeting of the Illuminating Engineering Society and the Association of Public Lighting Engineers.

Meetings in Provincial Centres.

In accordance with a desire expressed by members in the Midland and North-Western Areas, two special meetings were arranged, in Birmingham on March 14th, and in Manchester on March 10th. At the former meeting Mr. S. T. Allen (Manager of the Central England Area of the Central Electricity Board) presided. A paper on "Commercial and Industrial Lighting" was read by Mr. D. Spencer-Johns, and was followed by an address by Mr. P. E. Shopland (H.M. Inspector of Factories) on "Some Observations of Lighting in Factories." This paper contained an informative record of tests in various factories in the Midland area, and illustrated the opportunities for still further improvement in lighting conditions.

At the meeting in Manchester, over which Mr. Julius Frith presided, an address entitled "Some Thoughts on the International Illumination Congress," was delivered by Mr. C. C. Paterson. On both occasions there was a good attendance, and the addresses were followed by a discussion.

Proposed Local Centres.

At the two meetings referred to above the opportunity was taken to discuss the proposal, which members in the Midland and North-Western Areas have for some time entertained, that local centres should be established. Dr. J. W. T. Walsh and Mr. J. S. Dow, who attended both meetings, expressed the desire of the Council to do everything possible to aid in the realization of this aim, feeling that, if the work of the Society is to extend as it should do, opportunities for meetings and discussions in other areas besides London must be afforded.

The conditions under which local centres will operate can only gradually be evolved, but in the discussions in both areas it was suggested that a minimum of 50 to 60 members was desirable before a local centre is formally established, and that when this step is taken the chairman of the local centre should be a member of the Council, which would thus be kept in touch with developments in all active areas. Resolutions in favour of the ultimate establishment of a local centre were passed at both gatherings, and provisional committees were appointed to deal with the matter and to prepare programmes of meetings by the autumn. The committee appointed in Birmingham consisted of Mr. W. Y. Anderson (convener), Mr. H. S. Allpress, Mr. F. F. Middleton and Mr. P. J. Watson. The committee formed in Manchester was composed of Mr. R. C. Hawkins, Mr. T. Hunter, Mr. A. E. Jepson, Mr. L. Lacey, Mr. F. J. Palin, Mr. H. J. Robinson and Mr. John Swarbrick. Both committees have power to co-opt.

Mr. R. G. Marsh (City of Birmingham Gas Department, The Council House, Birmingham) has kindly consented to act as Hon. Secretary in the Midland Area, and Mr. J. Sellars (Public Lighting Department, Town Hall, Manchester) is acting in a similar capacity in Manchester.

Since the date of these meetings a desire has been expressed for the formation of a local centre in the Glasgow Area, and the formation of a provisional committee in that city is also being considered.

Increase in Membership.

In previous reports the Council has emphasized the importance of increasing the membership of the Society, which still falls far short of what might be expected, considering the growth of interest in the topics with which the Society is concerned. During the past session, however, 71 members of all classes have been added to the list. This increase is due mainly to three causes, the increased interest shown in the Society as a result of the activities in the Midland and North-Western Areas, the publicity given to the Society by the International Illumination Congress, which has led to the welcome addition of a number of members abroad, and the efforts made by the Membership Committee to add to the list of Sustaining Members. Twelve undertakings concerned with gas or electric supply have joined on this basis during the past session. The Council notes with special pleasure this evidence of interest on the part of supply undertakings—a section of the lighting industry which it is felt has hitherto been inadequately represented in the Society.

Bearing in mind the prevailing depression, the addition mentioned above (which is roughly 30 per cent. greater than that recorded in the previous annual report) is encouraging. It must, however, be remembered that in such times as the present some loss in membership through resignations is inevitable. It is therefore hoped that members of the Society will do all in their power to aid the effort of the Membership Committee to secure a still greater influx during the coming session. In order to assist such efforts the Council has in view the preparation of a leaflet summarizing the work and aims of the Society and the preparation of a printed membership list.

The Annual Dinner.

The annual dinner, which took place at the Trocadero Restaurant, Piccadilly Circus, on February 9th, was again a successful and enjoyable event. It is noteworthy that the attendance in the previous year (which was itself a record) was

The Illuminating Engineering Society

32, VICTORIA STREET, LONDON, S.W.1

Dr. INCOME AND EXPENDITURE ACCOUNT FOR THE YEAR ENDED 31st DECEMBER, 1931. *Cr.*

EXPENDITURE.

	£ s. d.	£ s. d.
To Administration Expenses—		
Rent, etc.	150 0 0	
Printing	88 3 9	
Duplicating	31 14 8	
Postage and Petty Cash	48 0 9	
Hire of Halls for Meetings ...	32 16 6	
Refreshments at Meetings	16 5 6	
Reports and Lantern Operators ...	13 15 0	
Bank Charges	0 10 0	
		381 6 2
,, Annual Dinner	143 12 3	
Less Receipts	133 5 0	
		10 7 3
,, Illuminating Engineering Publishing Co., Ltd., Share of Subscriptions		278 16 0
,, National Illumination Committee		32 0 0
,, Incorporation Expenses		14 9 6
,, Advisory Council of the Building Trade ..		10 10 0
,, International Illumination Congress—		
(*a*) Contribution from Funds of the Illuminating Engineering Society		250 0 0
(*b*) Contribution to be raised by Special Subscriptions		250 0 0
,, Excess Income over Expenditure		25 4 6
		£1,252 13 5

INCOME.

	£ s. d.	£ s. d.
By Subscriptions		953 4 0
,, ,, outstanding, estimated		20 0 0
,, Interest on Deposit		6 11 5
,, War Loan Interest		20 0 0
,, Library Association		5 0 0
,, Subscriptions *re* International Illumination Congress received, 1931	£225 0 0	
do. 1932	25 0 0	
	250 0 0	
Less Paid Direct to the International Illumination Congress	2 2 0	
		247 18 0
		£1,252 13 5

BALANCE SHEET, 31st DECEMBER, 1931.

	£ s. d.	£ s. d.
Creditors	107 7 6	
Subscriptions paid in advance	28 7 0	
Contribution to the International Illumination Congress (paid in 1932)	250 0 0	
Capital Account :—	£ s. d.	
Balance from last Account	625 9 10	
Add Excess Income over Expenditure for the year	25 4 6	
	650 14 4	
	£1,036 8 10	
Cash at Bank—		
Current Account		270 6 0
Deposit		283 9 0
Cash in Hand		21 2 10
£400 5 per cent. War Loan—		
Registered Stock		416 11 0
Subscriptions Outstanding		20 0 0
do. *re* International Illumination Congress		25 0 0
		£1,036 8 10

LEON GASTER MEMORIAL FUND ACCOUNT, 31st DECEMBER, 1931.

	£ s. d.	£ s. d.
Fund at the beginning of the year	266 18 2	
War Loan Interest	11 10 0	
		£278 8 2
Expended during year, viz.—		
Premium for 1931-32	10 10 0	
Printing Certificate, etc.	18 9 0	
		28 19 0
Balance—		
Cash at Bank...	12 16 0	
Invested in £230 War Loan ...	236 13 2	
		249 9 2
		£278 8 2

We have examined the above accounts with books and vouchers, and certify same to be correct in accordance therewith, and that the Balance Sheet exhibits a true and correct view of the Society's affairs according to the information and explanations given to us.

Dated this 19th day of March, 1932.

ROBERT J. WARD & Co., *Chartered Accountants*,
10, Serjeant's Inn,
Fleet Street, London, E.C. 4.

surpassed, the 200 mark being passed for the first time in the history of the Society.

The toast of "The Illuminating Engineering Society" was proposed by Mr. P. J. Pybus (Minister of Transport). The President (Sir Francis Goodenough), in responding, alluded to the efforts of various members in connection with the International Illumination Congress—the outstanding event of the year—and the efficient work of its hon. general secretary. The toast of "The Guests" was proposed by Mr. C. W. Sully, and was associated with the names of Captain J. M. Donaldson (President of the Institution of Electrical Engineers) and Mr. Sydney Tatchell (Vice-President of the Royal Institute of British Architects). Numerous kindred institutions and societies were represented on the list of guests. The latter part of the evening, left free for dancing and social intercourse, proved quite as enjoyable as in previous years.

Financial Position.

The accounts for the past financial year, which have been duly audited by Messrs. Robert J. Ward & Co., chartered accountants, are attached to this report.

The income of the Society again shows an increase, being for the first time in the history of the Society slightly over the £1,000 mark. This gratifying result has been attained notwithstanding the fact that the Society, in common with others, has experienced increased difficulty in collecting subscriptions during the past year. It will be observed that the Society contributed £250 from its own funds to the International Illumination Congress, and that it was also successful in carrying out its intention of raising a further £250 for this purpose from special sources. The thanks of the Council are due to all those members and firms who contributed to this extra fund at a time when there were many other demands on their generosity.

To have made these special contributions, and yet preserved a small surplus of income over expenditure, is doubtless a satisfactory performance. During the coming session the Council hopes to be able to improve still further the present position, which, whilst in itself very satisfactory, requires to be strengthened in view of the fact that expenditure on the growing activities of the Society (such as those involved in the creation of local centres) necessarily tends to increase.

The International Illumination Congress.

The International Illumination Congress, held in this country for the first time during September 1st to September 9th, was by general consent an outstanding success, and it was surely a feat to have carried the programme through during a year of unparalleled financial depression. The Society is entitled to feel some degree of satisfaction in the part played by so many of its members, who served on committees and in other ways shared in the enormous amount of work that such a Congress inevitably involves. Whilst it is impossible to mention more than a few members who were prominently associated with the Congress, it may be recalled that the President of the Congress (Mr. Clifford C. Paterson) is a Past President of the Society; the Chairman of the General Council (Lieut.-Col. Kenelm Edgcumbe) was our President last year; the Hon. Treasurer of the Congress (Sir Francis Goodenough) is our President for 1931-32. Amongst others whose services cannot be overlooked are Dr. J. W. T. Walsh (Chairman of the Technical Papers and Publications Committee), Mr. C. W. Sully (Chairman of the Programme and Entertainments Committee) and Mr. Percy Good (Chairman of the London Committee).

Finally, the Council desire to take this opportunity of again alluding to the excellent work of the Hon. General Secretary of the Congress, Col. C. H. Silvester Evans), which it has already recognized by electing Col. Evans a life member of the Society, without payment of subscription.

The Congress happily terminated its activities with a surplus of funds, and the following resolution was passed at a recent meeting of the Executive Committee:—

> "That the balance of the Congress funds remaining after payment of the cited liabilities, and estimated at about £200, be handed over to the Illuminating Engineering Society, with a recommendation that their Council be asked to consider the establishment of a permanent memorial of the Congress, e.g., in the nature of a premium."

The Council desires to express its appreciation of this decision, and proposes to apply the surplus fund in the manner suggested. The exact method of procedure will be announced in due course.

Francis Goodenough, *President.*
J. S. Dow, *Hon. Secretary.*

Literature on Lighting

(Abstracts of recent articles on Illumination and Photometry in the Technical Press)

(*Continued from Page* 158, *June*, 1932).

Abstracts are classified under the following headings: I, Radiation and General Physics; II, Photometry; III, Sources of Light; IV, Lighting Equipment; V, Applications of Light; VI, Miscellaneous. The following, whose initials appear under the items for which they were responsible, have already assisted in the compilation of abstracts: Miss E. S. Barclay-Smith, Mr. W. Barnett, Mr. S. S. Beggs, Mr. F. J. C. Brookes, Mr. H. Buckley, Mr. L. J. Collier, Mr. H. M. Cotterill, Mr. J. S. Dow, Dr. S. English, Dr. T. H. Harrison, Mr. C. A. Morton, Mr. G. S. Robinson, Mr. J. M. Waldram, Mr. W. C. M. Whittle and Mr. G. H. Wilson. Abstracts cover the month preceding the date of publication. When desired by readers we will gladly endeavour to obtain copies of journals containing any articles abstracted and will supply them at cost.—Ed.

I.—RADIATION AND GENERAL PHYSICS.

145. Ultra-violet Radiation and Fading of Materials. M. Luckiesh.

El. World, 99, *p.* 890, *May 21st*, 1932.

Gives conclusions arrived at as the result of a series of tests made to determine the relative amounts of fading caused in textiles by various light-sources. W. C. M. W.

146. Transparency of the Pure Atmosphere. J. Duclaux and M. Hugon.

Comptes Rendus, *Vol.* 194, *pp.* 1842-44. *May 23rd*, 1932.

An attempt has been made to determine the transparency of the pure atmosphere at various wavelengths of radiation, from 7,500 A to 3,650 A. A lower limit is stated for each wavelength considered, though the authors point out that much higher figures may be obtained under special conditions.

S. S. B.

147. On the Transparency of the Air. P. Chofardet.

Comptes Rendus, Vol. 194, *pp.* 1844-46. *May 23rd*, 1932.

Observations have been made since 1912 on the visibility of high Alpine peaks, and particularly Mont Blanc, from two stations near Besancon, 165 km. distant. A record was kept of the number of days in each month on which the air was sufficiently clear for the peaks to be distinguished. Taking a mean over this period for each month, it is found that the frequency of visibility of Mont Blanc is a maximum in December and January, and a minimum in April, May and June. It is most frequent at sunrise, and occurs as often with an overcast sky as with a clear one. The damp ocean winds produce the best visibility, and the higher peaks are sometimes obscured while the lower snows are visible. S. S. B.

148. Note on the Absorption of Light. R. A. Houston.

Trans. Opt. Soc., Vol. XXXIII, No. 2, pp. 63-65, 1931-1932.

The paper describes a verification of the law of the absorption of light in liquids and glasses over a range of intensity of 1 to 15,000. The speculative views of the nature of light held at present in many quarters render it possible that the law may break down, and attention is called to the desirability of further work on the subject. F. J. C. B.

149. Influence of Mixed Light on Photoelectric Measurements. Trajan D. Georghiu.

Comptes Rendus, Vol. 194, *pp.* 1810-1813. *May 23rd*, 1932.

The author discusses the effect of a pencil including light not absolutely monochromatic, and shows how errors are introduced. Deals particularly with measurement of absorption factors. S. S. B.

150. Young's Theory of Colour Vision.

Trans. Opt. Soc., Vol. XXXIII, No. 5, *pp.* 165-183, 1930-1931.

The Thomas Young Oration of the Optical Society, delivered by Sir John H. Parsons. F. J. C. B.

II.—PHOTOMETRY.

151. A New Photoelectric Spectrophotometer. F. Campbell Smith and Ensor R. Holiday.

Trans. Opt. Soc., Vol. XXXIII, No. 1, *pp.* 20-25, 1931-1932.

The photometer described makes use of a device by means of which absorption measurements may be made in the ultra-violet region of the spectrum without recourse to calibrated wedges and sectors. The hydrogen-discharge tube is used as the source of radiation. A photoelectric bridge is employed, one arm of which is controlled by a small fraction of the light falling on a third cell; the current from the latter may be measured galvanometrically. The two fractions are kept in constant proportion over the range of intensities used. F. J. C. B.

152. The "Spekker" Photometer for Ultra-violet Spectrophotometry.

Trans. Opt. Soc., Vol. XXXIII, No. 1, *pp.* 9-19, 1931-1932.

The design and construction of the "Spekker" photometer are described, special attention being paid to certain pitfalls of spectrophotometry which have been avoided in the instrument. F. J. C. B.

153. Rotator for Incandescent Lamps.

Société belge d'Optique. Revue d'Optique, Vol. II, No. 2, p. 74, *Feb.*, 1932.

Describes a rotator for the photometry of the polar distribution of bare lamps adapted for use with a photometer bench. The apparatus consists of a vertical rod held in a stand carrying a horizontal rod which can rotate about the axis of the former rod, its angular position being indicated on a scale. The horizontal rod carries an adjustable bracket on one end, having a horizontal spindle carrying the lampholder, which can be rotated by a small motor. A counterweight is placed at the other end of the horizontal rod. Collector rings are provided on the spindle for supplying the lamp, and ball bearings are used. J. M. W.

III.—SOURCES OF LIGHT.

154. The Tungsten Lamp. W. E. Forsythe and E. M. Watson.

Frank. Inst. Jour., 213, *pp.* 623-637. *June*, 1932.

After a brief description of the development of the filament lamp, the authors stress the fact that no source has yet been found to be as satisfactory as the tungsten filament, despite extensive researches of discharge lamps and the like. This is due to favourable radiating characteristics, lower vapour pressure and high melting-point, high tensile strength and ductility of tungsten. The variation of efficiency with temperature is shown, and the first attempts at gas-filling is described with the introduction of the coiled filament. A table of characteristics of incandescent lamps is given, showing temperatures, efficiencies, and losses due to the gas-filling, lead-in wires, supports, etc. The life of the lamp is considered, and a 600-hour life rate stated to be the cheapest per lumen-hour of light. Frosting of the lamp bulb is mentioned, and the effect of coiling the filament in vacuum lamps. The maximum theoretical efficiency of a light-source is discussed, and the possibilities of filamentless lamps, such as mercury and sodium arcs, and other gas discharges. S. S. B.

155. Combination Vapour-Incandescent Lighting for Philadelphia Showroom. Anon.

El. World, 99, *p.* 900, *May 21st*, 1932.

Low-voltage mercury-vapour tubes are combined with incandescent lamps in special units to produce high-intensity lighting approximating to daylight. The advantages of combination lighting are discussed. Photographs of the unit and installation are given. W. C. M. W.

IV.—LIGHTING EQUIPMENT.

156. Apparatus for Illumination with a Sharply Defined Beam. Usines Gallus.

Revue d'Optique, Vol. 11, *No.* 2, *p.* 75, *Feb.*, 1932.

Describes an apparatus consisting of a small projector using a 50-watt or 100-watt lamp and an optical-lantern system intended for the illumination of objects by beams of light having sharply defined edges. Suitably shaped masks can be placed over the condenser. Further effects are possible by the projection of transparencies obtained photographically, or of shaded or coloured masks. The apparatus is light and compact. J. M. W.

157. Where to Place the Light. Anon.

Brit. J. Photog., Vol. LXXIX, No. 3,756, *pp.* 254-255, *April 29th*, 1932.

Advice is given on the installation and use of floodlights and spotlights for photographic portraiture. F. J. C. B.

V.—APPLICATIONS OF LIGHT.

158. The Illumination Criterion in Street Lighting. J. W. T. Walsh.

World Power, 17, *pp.* 398-403, *June*, 1932.

The conflict of the claims of minimum and of average illumination as a criterion of the rating of a given street-lighting installation is discussed, and a compromise is suggested. A method of calculation of average illumination, with particular reference to asymmetric fittings, is presented. From a sinusoidal diagram the flux incident on the roadway, and therefore the average illumination within the unit of the system, can be determined. This calculation is somewhat lengthy, and it is suggested that a "conventional" average from ten uniformly spaced points in the unit of system can be found either by calculation or test. Such an average should form a useful compromise to the two present criteria. C. A. M.

159. Public Lighting. W. J. Jones and J. N. Waite.

Elect., 108, *pp.* 822-827, *June 17th*, 1932.

A summary of a paper discussing in detail the use of gas and electricity for public lighting. Depreciation and maintenance, and fluctuations of voltage and of gas pressure, are discussed. C. A. M.

160. Factors of Exposure. Anon.

Brit. J. Photog., *Vol. LXXIX*, *No.* 3,757, *pp.* 270-71, *May 6th*, 1932.

It is pointed out that the shortening of the life of a gasfilled lamp when operated slightly above the normal rating is more than compensated for by the increased actinic value of its light when used for photographic purposes. F. J. C. B.

161. Garden-Restaurant Illumination. Anon. Ideal Garden Illumination. H. Martin.

Licht und Lampe, 11, *pp.* 165 *and* 167, 1932.

The first paper deals briefly with methods of outdoor restaurant illumination and gives illustrations. The second paper gives some of the principles of garden and park illumination. E. S. B-S.

162. Light and Architecture. Anon.

Am. Illum. Eng. Soc., Trans., 27, *pp.* 433-442, *May*, 1932.

Eight modern lighting installations are described with illustrations. G. H. W.

163. Production and Application of Light.

Elect. Engineering, 51, *pp.* 447-53, *June*, 1932.

This report contains a survey of the improvements made in illuminating engineering in United States during 1931.

It is divided into grouped headings as follows: New incandescent lamps; specification of wiring; carbon arcs; gaseous-discharge tubes; indoor and outdoor applications of lighting; light signalling; and measurement and control of light.

There are also short descriptive notes on the illuminations for the 1933 Chicago Fair and the 1931 International Commission on Illumination. G. S. R.

164. "White City" Lighting. Anon.

Elect., 108, *p.* 771, *June 3rd*, 1932.

A new system of track lighting at the White City has been adopted. Fittings used may, if required, be lowered to ground level, so that no obstruction will be caused when the centre of the playing field is in use. It is claimed that the adjustment in height will combat fog or bad visibility. C. A. M.

165. Welland Ship Canal Lighting. R. M. Love, M. B. Hastings and G. F. Mudgett.

Am. Illum. Eng. Soc., Trans., 27, *pp.* 443-58, *May*, 1932.

After a brief history and description of the canal, the lighting equipment is described. Half-drum Fresnel lenses are used for lighting the main reaches of the canal and B-symmetric refractors for the lock lighting. G. H. W.

166. A Hundred Foot-candles of Supplementary Illumination. M. Luckiesh.

El. World, *Vol.* 99, *p.* 851, *May 14th*, 1932.

Describes a test made to determine the effect on seeing of the angle subtended at the eye by a bright surface and the contrast between the bright area and the surroundings. The criterion used was the precision of seeing. W. C. M. W.

VI.—MISCELLANEOUS.

167. On Some Relations between the Various Coefficients by Means of which the Diffusing Properties of a Surface can be Expressed. A. Boutarie.

Rev. d'Optique, 12, *pp.* 485-494, *December*, 1931.

When a surface is illuminated part of the incident radiation is regularly reflected, and part is diffused. The phenomena of diffusion can be expressed with the aid of a certain number of coefficients. The author defines and discusses such coefficients and establishes the relations between them. L. J. C.

168. On the Transparency of the Lower Atmosphere. H. Buisson, C. Jausseran, and P. Rouard.

Comtes Rendus, 194, *pp.* 1477-79, *April 25th*, 1932.

In continuation of earlier work, the authors have measured the absorption by the atmosphere of radiation extending down to ultra-violet wavelengths absorbed by a few metres of air. S. S. B.

169. New Processes for Photographic Sensitivity Measurements. O. Reeb.

Licht u. Lampe, 8, *p.* 116, 1932.

Traces the development of methods of measuring the sensitivity of photographic plates. Gives some account of the apparatus exhibited and papers read at the eighth International Congress of Photography, held at Dresden in 1931. E. S. B-S.

170. Illumination for Photographing Large Objects by Transmitted Light. Louis Paul Flory.

Brit. J. Photog., *Vol. LXXIX*, *No.* 3,760, *p.* 321, *May 17th*, 1932.

Describes method and apparatus for illuminating specimens contained in glass trays by transmitted light whilst passing them horizontally for the use of a vertical camera. F. J. C. B.

171. The Optical Determination of Internal Stresses. Henry Favre.

Rev. d'Optique, *Vol.* 11, *No.* 1, *p.* 1, *Jan.*, 1932.

Describes in detail photoelastic apparatus for the precise investigation of the stresses in transparent models of structural parts, by purely optical photoelastic methods. The theory is given in a previous paper (*Rev. d'Optique*, 1929; *May, June, July and August*). J. M. W.

172. The Modern Institute. A. F. Loewe.

Am. Illum. Eng. Soc., Trans., 27, *pp.* 459-486, *May*, 1932.

The paper suggests types of equipment and logical steps in the development of demonstrations for a lighting institute. G. H. W.

Incorporated Municipal Electrical Association Annual Convention

An Interesting Lighting Scheme

At the reception given in the Assembly Room of the Cardiff City Hall, on the evening of June 15th, preceding the annual convention of the Incorporatel Municipal Electrical Association, delegates were much interested in the graceful scheme of decorative lighting which had been specially prepared for the gathering. To select a scheme in harmony with this dignified interior, a marble-pillared hall, was no easy matter. The first idea was to make use of the stained-glass window design. There are two mullions in each window, and it was proposed to put against the glass some coloured panels (containing, say, allegorical figures), whilst projectors, mounted outside, directed coloured light into the hall, after the manner of a cathedral or a manorial banqueting room. Unfortunately, the experiment revealed a diffused white halo—a " flare spot "—in the panelled windows, and this proved fatal to the design.

This photograph of the Assembly Room at Cardiff has been kept dark deliberately in order to show the positions of the special lighting units around the cornice and in the alcoves, which, as the photograph suggests, proved extremely effective.

A simple but effective scheme subsequently adopted made use of two gilt-sprayed troughs placed on top of the cornice on the two long sides of the hall, and accommodating 200-volt 60-watt pearl Mazda lamps. Beams of red, blue and green light were directed on the ceiling and upper walls, the colours being varied progressively by means of dimmers. A further example of modern methods was provided in the eight alcoves round the lower walls, where concealed lamps, shining through cunningly arranged ferns, furnished a soft and pleasing effect. All the wiring was invisible, and ran to a control room situated in the kitchen. This scheme, which was rendered possible by the co-operation of the City Electrical Engineer, Mr. Morley New, President of the I.M.E.A., was carried out by the Cardiff Installation Department to the order of the British Thomson-Houston Co. Ltd.

Theatre and Cinema Lighting Equipment

A catalogue dealing with the above subject, executed in a novel and enterprising manner, has been recently published by the Major Equipment Co. Ltd. The introduction contains an imposing list of cinemas and theatres in which " Major " type switchboards have been installed, and in the body of the catalogue all the necessary equipment, battens and footlights, spotlights, horizon floods, cloud and effect machines, etc., are illustrated. Of interest, too, are such specialities as the stage-floor plugs, wall pockets, louvre lights (for gangways, stairs, etc.), and poster-frame lighting. The colour printing enables the three-colour systems of the battens and footlights to be effectively shown. The blocks (displayed against a tinted cream background) showing the general appearance of the various forms of apparatus are well executed, and particulars of dimensions, etc., are given. An excellent feature, which should be of considerable service to the architect, is the series of dimensional sketches, in white lines on a blue background, showing precisely how each implement may be installed. At the end of the catalogue various types of switchboards are illustrated, and sections are devoted to floodlighting and studio-lighting equipment. An adequate index completes a workmanlike job.

Kandem Electrical Limited

We are informed that the name of Messrs. Korting & Mathiesen Electrical Ltd., to whose new works we made reference in our last issue, has been changed to KANDEM ELECTRICAL LTD. (The word " Kandem," as applied to the company's distinctive products, is, of course, familiar.)

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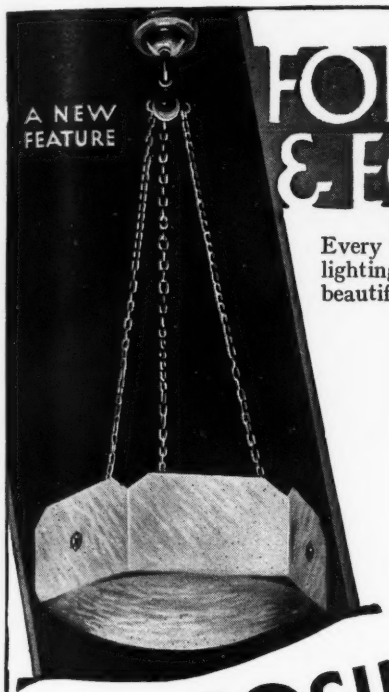

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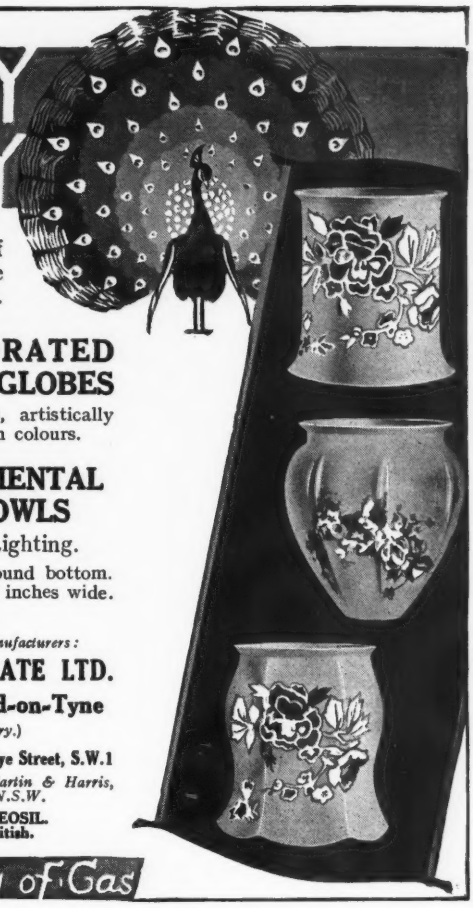

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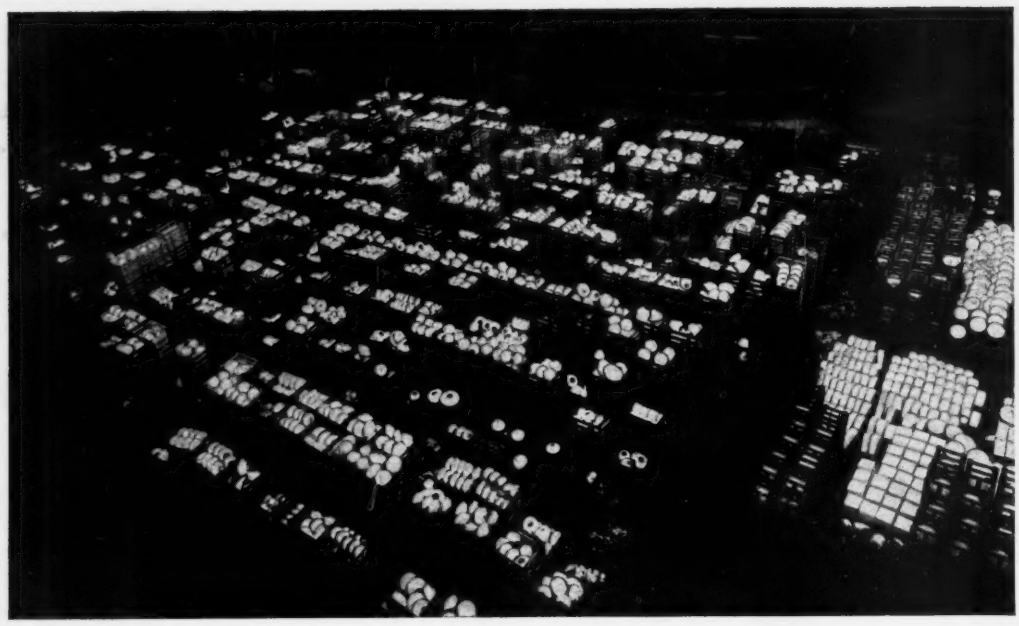
Parker St., Kingsway, LONDON, W.C. 2.



A view of one of the Stock Yards of Messrs. Hailwood & Ackroyd, Ltd.

British Glassware: Large Stock Yards

We reproduce above an impressive photograph of one of the stock yards of Messrs. Hailwood & Ackroyd, with whose British-made glassware readers of this journal are familiar. This is only one of six stock yards maintained by the firm, who have also a number of buildings filled with their products. This illustrates the magnitude of the operations. The quantity of glass produced per day in a large modern glassworks is so enormous that acres of ground can quickly be covered. In the circumstances one can sympathize with manufacturers who are faced by a set-back in orders, such as, it is stated, followed the recent diminution in the tariff. We understand, however, that from the user's standpoint the maintenance of large stocks at the works for a while is no drawback, but rather an advantage in that it enables the glassware to get well tested by weather conditions, and accordingly is all the more likely to prove durable in the hands of customers.

Our attention has also been drawn to an ingenious effort of Messrs. Hailwood & Ackroyd, namely, an advertisement of Pear's Soap, in the form of a baby modelled in glass and sitting on a glass base, below which lamps are mounted. The light, directed upwards, illuminated the body of the child, producing a pleasing effect. We understand that this device is to be mass-produced for the general use of chemists in their shop windows.

Erratum

Our attention has been drawn to an evident error in the account of the lighting of show windows of Messrs. Gooch's, Knightbridge, which appeared in our last issue (p. 160). We are asked by Messrs. Holophane Ltd. to state that the 150-watt lamps used in connection with the angled prismatic reflectors were spaced approximately *14 inches* apart (not 14 feet).

The Ancient "Lanthorn"

In the May issue of *The Wigan Review*, issued by Messrs. Heyes & Co. Ltd., the sixth of the twelve epochs of artificial lighting, the period of "lanthorns," is reached. Some amusing references to early lanterns are quoted, and its later developments, the "bull's-eye" and the miner's lamp, are mentioned. It is observed that within a couple of decades, early in the last century, as many as 50 pamphlets on this form of lamp appeared. At that time, it is estimated, the lamp did not yield more than about 1/40 candle-power—surely an incredibly poor light, considering the hazardous conditions of work it was intended to ameliorate. The latest lamp, brought out by a Wigan firm, is stated to yield more than 4 candle-power—certainly a vast improvement, though even to-day the miner receives far less than the illumination he really needs. Elsewhere in the booklet reference is made to the recently built s.s. "Strathnaver" (P. & O. Line), on which "Wigan" prismatic fittings have been installed.

St. Mary-le-Bow Church Floodlighted

The tower of St. Mary-le-Bow, whose bells, the story relates, induced Whittington to retrace his steps to London, where he thrice became Lord Mayor, has recently been floodlighted. The installation is a somewhat unusual one, the various portions of the tower receiving local treatment. Thus units are applied to the illumination of the lower portion of the tower and the flying buttresses, whilst the lighting of the spire was effected by means of a system of 1,000-watt G.E.C. floodlights installed on the roofs of neighbouring buildings. Some ingenuity was necessary in order to avoid unsightly shadows, but the ultimate effect, as illustrated in a photograph taken for the General Electric Co. Ltd., seems to be very effective. We may mention that the scheme was designed by the Illuminating Engineering Department of the General Electric Co. Ltd., who acted in collaboration with the City of London Electric Lighting Co. Ltd., the church authorities and the electrical contractors (Messrs. Troughton & Young).